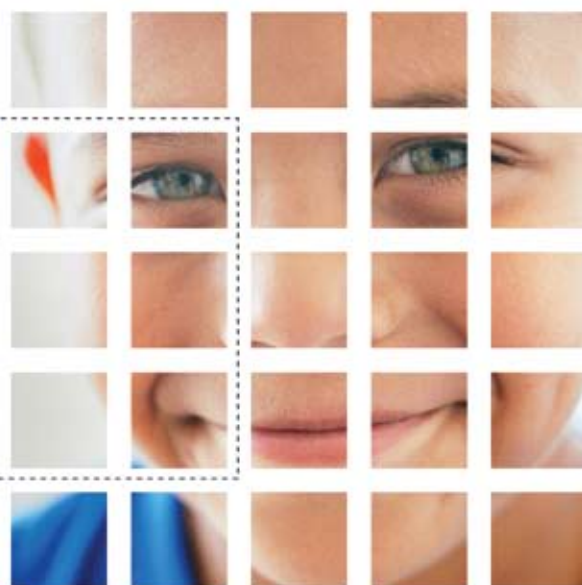


CHALLENGING THE Whole Child

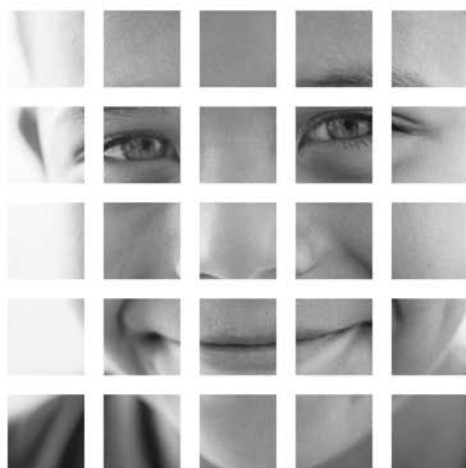
Reflections on
Best Practices in Learning,
Teaching, and Leadership



Edited by
Marge Scherer

CHALLENGING THE Whole Child

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Best Practices in Learning,
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ASCD

Alexandria, Virginia USA



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Foreword

The 21st century demands a highly skilled, educated work force and citizenry unlike any we have seen before. The global marketplace and economy are a reality. Change and innovation have become the new status quo while too many of our schools, communities, and systems use models designed to prepare young people for life in the middle of the last century. We live in a time that requires our students to be prepared to think both critically and creatively, to evaluate massive amounts of information, solve complex problems, and communicate well, yet our education systems remain committed to time structures, coursework, instructional methods, and assessments designed more than a century ago. A strong foundation in reading, writing, math, and other core subjects is as important as ever, yet insufficient for lifelong success.

These 21st century demands require a new and better way of approaching education policy and practice—a whole child approach to learning, teaching, and community engagement. What if decisions about education policy were made by first asking, “What works best for children?” What if the education, health, housing, public safety, recreation, and business systems within our communities aligned human and capital resources to provide coordinated service to kids and families? What if policymakers at all levels worked with educators, families, and community members to ensure that we as a society meet our social compact to prepare children for their future rather than our past?

The answers push us to redefine what a successful learner is and how we measure success. It is time to put students first, align resources to students’ multiple needs, and advocate for a more balanced approach. A child who enters school in good health, feels safe, and is connected to her school is ready to learn. A student who has at least one adult in

school who understands his social and emotional development is more likely to stay in school. All students who have access to challenging academic programs are better prepared for further education, work, and civic life.

ASCD proposes a definition of achievement and accountability that promotes the development of children who are healthy, safe, engaged, supported, and challenged.

ASCD's Whole Child Tenets

- Each student enters school **healthy** and learns about and practices a healthy lifestyle.
- Each student learns in an intellectually challenging environment that is physically and emotionally **safe** for students and adults.
- Each student is actively **engaged** in learning and is connected to the school and broader community.
- Each student has access to personalized learning and is **supported** by qualified, caring adults.
- Each graduate is **challenged** academically and prepared for success in college or further study and for employment in a global environment.

ASCD is helping schools, districts, and communities move from rhetoric about educating the whole child to reality. No single person, institution, or system can work in isolation to achieve such results so we have launched a Web site for educators, families, community members, and policymakers to share their stories, access resources, assess their progress, and advocate for children. Join us at www.wholechildeducation.org. Our children deserve it. Our future demands it.

—Molly McCloskey
Host of the Whole Child Podcast

Introduction

Rising to the Challenge

Think back to a recent challenge that you faced successfully. Are you recalling a problem you overcame, a task you accomplished, or a skill that you sharpened or even mastered? Did someone else set this challenge for you—your boss, a family member, students, colleagues? Was the challenge dictated by your life circumstances, or did you create the challenge for yourself? Depending on all these factors, you may or may not feel pleased that this particular challenge found its way into your life. But chances are that you are now more prepared than you used to be to tackle the next challenge that awaits you.

In a recent report titled *Diploma to Nowhere*, high school graduates who were struggling so much in college that they had to enroll in remedial courses reported something surprising: They said that they wished their high schools had challenged them more. About 40 percent of these students, most of whom had taken college prep courses and gotten *As* and *Bs*, said that their high schools had done a poor or fair job of helping them understand the knowledge and skills they needed for college success. Almost 60 percent said that high school classes were easy, and one half said they were bored in high school. Eighty percent said that they would have worked harder if their high school had set higher expectations.¹

Unfortunately, having to rise to the challenge of taking remedial classes during their college years did not ensure these students' success. The researchers note that a large number of them gave up on attaining their degrees and dropped out of college.

Too often the concept of challenging students is oversimplified. Some reformers believe that all students would benefit from universally tough classes. Others put their faith in the power of tests to challenge students to learn. But higher-level courses are not helpful if the students fail to receive adequate support for them or if the classes are pseudo-higher-level, taken only for credit and not for learning. And universal expectations—for example, that all students must study advanced mathematics or that all must go to college—smack of a lack of appreciation for the many ways society needs individuals to excel. As for the power of tests, most former students will admit that many difficult tests call for only shallow, short-term learning.

So what kinds of challenges *do* encourage students to rise to challenges of their own and lead to lasting achievement? This special e-book collection of articles from *Educational Leadership* and other ASCD publications examines the kinds of challenges that best prepare students for college, the world of work, and life.²

Challenging the Whole Child begins by probing what excellence and high performance mean in various schools and settings around the world. Lead author Robert Sternberg emphasizes that to realize all students' potential, all students need to be challenged—not only the gifted and the college-bound but also the non-college-bound and those who have not yet attained proficiency at basic skills. Authors Andreas Schleicher and Vivien Stewart provide a glimpse of the many different ways world-class schools further high achievement in schools—from emphasizing accountability to encouraging more autonomy.

Our authors also explore how to make learning richer and more thought-provoking through both rigorous curriculum and formative assessment. They look at some ways that both elementary and secondary school teachers can teach problem-solving and innovative and analytical thinking, and they consider how to challenge students preparing for college as well as those readying themselves for careers after high school.

Articles also examine ways to lead students to address today's 21st-century problems, acknowledging that citizens of the future will face new challenges and will need new knowledge and skills. The final section takes on the all-important question, How do we motivate students to embrace challenge? Both research and experience suggest that when students choose and take on the challenges themselves, they are much more likely to persevere.

In 2005 when ASCD decided it was time to reemphasize education for the whole child, some critics wrote that such an aim was “soft and squishy.” Their criticism overlooked an essential component of whole child education. Although those who advocate for education for the whole child may not believe that a single “get tough” strategy works, they know that offering students meaningful challenges does. Children—much like adults—learn best when they are engaged, supported, safe, healthy—and, most surely, challenged.

—Marge Scherer

Editor in Chief, *Educational Leadership*

Endnotes

¹ Strong American Schools. (2008). *Diploma to Nowhere*. Washington, DC: Author.

² See the first in this series of e-books, *Engaging the Whole Child* (ASCD, 2009).



Part 1

Challenging
Every Student

Excellence for All

Robert J. Sternberg

There's more to excellence than reading, writing, and arithmetic.

What does it mean for a school to be “excellent”? Is it excellent if no one fails but no one does terrifically well either? Is it excellent if the best, but only the best, do superbly? This question is important because the way we define excellence dictates the way we achieve it.

Common Models of Excellence

Let's look at four models of excellence that operate in our schools today. The following portraits are based on real schools that I have observed, although the names are pseudonyms.

Looking Only at the Bottom

Administrators at Shadyside School know which side their bread is buttered on. The district's rewards go to the schools that best meet the mandates of No Child Left Behind (NCLB). So Shadyside has put its resources into ensuring that it looks as good as possible under NCLB's definition of excellence.

The school places heavy emphasis on reading and math. Several other subjects get some attention, but less. The school has dropped physical education and minimized music and art. It has discontinued its gifted program, which, the administration believed, always con-

sumed more resources than it was worth for students who need special services the least.

Heavy spending goes into ensuring that students in the bottom half of the class perform well enough to meet minimum-competency standards. Because many of these low-performing students come from one section of town, some Shadyside administrators have been quietly lobbying for a redistricting plan that would reassign that area to a different school, thus raising Shadyside's test scores.

So far, the result of all these efforts has been modest but noticeable success in enhancing compliance with the federal law.

No Child Left Behind was advocated as a national model for achieving excellence in our schools. But this model is problematic because it focuses attention on only the bottom of the distribution. Imagine a hypothetical school in which, indeed, no child is left behind, but all children are achieving barely passing grades—in letter terms, *D-*. Would anyone call such a school excellent?

Further, No Child Left Behind encourages schools to drop or minimize important programs that are essential to truly excellent education—such as music, arts, and physical education—because these programs do not boost passing rates on particular tests. Even social studies may get short shrift. Do we really want our schools to resemble the test-preparation cram courses given by private tutoring organizations?

The law discourages schools from providing special services for gifted students because they will pass the tests anyway. It has even motivated some schools to stoop to such dubious practices as encouraging weaker students to drop out. Is this any way to achieve excellence?

Looking Only at the Top

Sunnyvale School is in one of the most economically advantaged sections of a wealthy suburb. The school is considered “la crème de la

crème” in the district. To be admitted to Sunnyvale’s gifted program, students need to have IQs in the top 1 percent of the general population. The school boasts of the number of its graduates who end up going to Ivy League schools and has a Hall of Fame for its most illustrious graduates.

Sunnyvale puts relatively few resources into students at the academic low end. Because few of these students are actually at risk for failing to meet minimum-competency standards, the administration believes it can afford to focus on stronger students who are likely to succeed in gaining admission to the most prestigious colleges.

The administration’s general view is that weaker students do not really belong in the school. In many different, often not-so-subtle ways, the school sends the message to these students that they are a drag on its reputation. For example, academically challenged students tend to get the weakest teachers and diluted courses. Although the school is careful to meet its legal obligations to students with special needs, any parents who demand more are told that they always have the option of a private school.

Sunnyvale’s model is the opposite of Shadyside’s. Sunnyvale lavishes its attention on the top end, and the result is a *Matthew effect*—the intellectually rich get richer, and the intellectually poor get poorer. Can we really consider a school excellent if it settles for mediocrity for a large portion of its students and gives only the academic superstars the opportunity to flourish?

Looking Only at the Middle

Brookdale School believes that one size fits all. It does not group students by ability or achievement, nor does it recognize or celebrate any kind of diversity within the heterogeneous groups. The teachers are not sure what to do for students with special needs; some teachers wish that such students would just go away. The school has no gifted

program, and it provides the minimum service mandated by law, if that, to students with developmental disabilities.

The school reflects its community, which celebrates social and intellectual conformity. Many of the residents have similar belief structures, which they want to pass on to their children. Excellence, they believe, is a well-rounded child who does what he or she is told and does not stick out through exceptionally weak or strong academic performance. Being popular is good, but being intellectually excellent is suspect. People know that “tall poppies” tend to be cut down.

The administrators and parents of children at Brookdale believe they have created an excellent school and a superb environment for learning. Students and faculty are comfortable with one another, having similar ways of thinking, beliefs, and values.

Brookdale defines academic excellence as intellectual conformity. But Brookdale students are being educated for a world that does not exist—a world in which everyone thinks like they do. Some may be afraid to leave the community because they are unprepared to cope. Those who do leave may be bewildered by and perhaps resentful and intolerant of the astonishing diversity of people, values, ideologies, and worldviews they will encounter. This model of education poorly serves its students and their community because it isolates them from a rapidly changing world. We can hardly view Brookdale as providing an excellent education.

Looking Only at the Statistical Average

Every year, the *Riverside Observer* publishes the average test scores of the five elementary schools in the Riverside School District as well as those of other districts in the state. The newspaper does a detailed analysis comparing the local schools to one another and comparing the district as a whole to other districts. Parents are well aware that real estate prices coincide closely with the test scores, and the board of education has exerted pressure on district administrators to

raise the statistical averages. The five schools in the district engage in a not-always-friendly competition to have the highest average scores. In one school, a principal was reprimanded for engaging in shady practices to enhance his school's ranking: Certain students' scores were "overlooked" when the averages were computed.

Currently, there is a national craze in the United States to raise statistical averages. Such averages are reported in the media and play a prominent role in *U.S. News and World Report's* ranking of colleges and graduate schools.

Riverside's model looks for excellence in high average scores. Individual students become cogs in a machine that operates like a huge calculator. Students are valued only to the extent that they raise the average scores. The model ignores students at both the upper and lower end—and it dehumanizes all students, including those in the middle.

An Alternative: The Three *Rs* and the Other Three *Rs*

A better model for defining and achieving excellence is to focus on excellence in education for *all* students and let the numbers emerge as a result of seeking excellence, rather than the main goal. Actually, this is what many schools once did before testing mania co-opted education.

The criteria for excellence are neither arcane nor complicated. I propose a simple model that focuses on the traditional three *Rs* plus what I call the other three *Rs* (Cogan, Sternberg, & Subotnik, 2006; Sternberg, 2006; Sternberg & Subotnik, 2006). You are probably familiar with the first three *Rs*: *reading*, *'riting*, and *'rithmetic*. So let me focus on the other three: *reasoning*, *resilience*, and *responsibility*. These latter three *Rs* complement and enhance the first three: It's not either/or, but rather, both/and.

Reasoning

Reasoning is a broad term that encompasses the comprehensive set of thinking skills that a person needs to be an engaged, active citizen of the world. These skills include

- Creative thinking to generate new and powerful ideas.
- Critical and analytical thinking to ensure that the ideas (your own and those of others) are good ones.
- Practical thinking to implement the ideas and persuade others of their value.
- Wise thinking to ensure that the ideas help build a common good.

Schools can teach reasoning in a number of ways, either through the disciplines (Sternberg & Grigorenko, 2007) or through a separate course (Sternberg, Kaufman, & Grigorenko, 2008). Either way, good reasoning complements knowledge by enabling students to use that knowledge well.

For example, presenting stories like the following can introduce students to scientific reasoning:

Professor Flowers believes that his special plant food, Proflower, helps plants grow to their full potential. He wishes to design an experiment to show that Proflower really does help plants grow. He takes five individual plant stems of each of three types of plants—orchids, tulips, and roses—and carefully places them in his special experimental room. He measures the height of each plant. Then, each day, he places in the soil for each plant exactly 15 drops of Proflower. All plants are watered the exact same amount and receive the same amount of sunshine. After 20 days, he compares the height of each plant to its height 20 days before. He finds that *all* of the plants have grown by at least 10 percent, and some by more than 20 percent. He then prepares a speech in which he argues that he

has scientifically proven that Proflower really does help plants grow.

Is Professor Flowers' reasoning correct? Why or why not?

The answer is that Professor Flowers is not correct. The problem is that there is no control group that received equal amounts of water and light—and no Proflower at all. It is possible that all of the plants in the sample would have grown by the same amount (or more!) if they had not been given Proflower. Hence, Professor Flowers' reasoning is flawed.

Resilience

Resilience refers to persistence in achieving goals despite the obstacles life places in our way. Some children grow up with many obstacles strewn across their paths; others have relatively smooth roads to travel. Either way, everyone encounters roadblocks sooner or later; the question is how you surmount them. Resilience involves

- Willingness to defy the crowd in your thinking and actions—to take the road less traveled.
- Willingness to surmount obstacles in trying to achieve your goals.
- Passion in your pursuits—going for your goals with drive, motivation, and personal involvement.
- Self-efficacy—belief in your ability to achieve your goals.

Schools can build students' resilience by modeling it; by implementing programs designed to develop it (see Patrikakou, Weissberg, Redding, Walberg, & Anderson, 2005); and by creating challenging experiences for students that require resilience to see them through.

One way of developing resilience is to tell students about a challenging experience you have had in your own life, preferably when you were about the students' age, and how you got through the challenge.

You can then encourage students to share their own challenges and how they have coped with them. The class can discuss what constitutes better and worse coping mechanisms, and how people can decide to employ better ones. (In my own case, when I talk to elementary school students I often tell them of how I used to do poorly on standardized intelligence tests as a child, and nevertheless, when I was 22, I was graduated with highest honors from Yale. Resilience pays off!)

Resilience is an important component of academic excellence. For example, Dweck (1999) found that students who have an incremental view of intelligence—who believe they can modify their intelligence—perform better when faced with challenging courses than do students who believe that intelligence is a stable, fixed entity.

Responsibility

Responsibility covers the ethical and moral dimension of development. Four components are particularly important:

- Ethics—distinguishing right from wrong.
- Wisdom—forging or following a path that represents a common good and balances your own interests with those of others.
- Care—genuine understanding of and empathy for others' well-being that goes beyond an intellectual sense that you *should* care.
- Right action—not only knowing the right thing to do, but doing it.

Schools can teach responsibility by modeling it, by providing case studies, and by challenging students with situations that require them to develop their own unique and personal sense of responsibility.

One way to learn about personal responsibility is by reading biographies of people who have shown wisdom and positive ethical values in their own lives. Examples might be Martin Luther King Jr. and

Nelson Mandela, both of whom made many personal sacrifices to help others. Mandela spent much of his life in prison before becoming the first president of South Africa in an election with broad participation from South Africans. King led civil rights marches at great personal risk to his life, which he eventually forfeited in the cause of justice for all.

Students can contemplate their own lives and how they have taken opportunities either to work for a common good or to be selfish and look out only for their self-interest. The great leaders of society, and of communities and families, are inevitably those who care about and for others and not just about and for themselves.

How to Teach for the Other 3 Rs

1. Emphasize excellence for all—not just those at the top, bottom, or middle of the distribution—and recognize diverse forms of excellence.
2. Provide students with opportunities to learn through multiple modalities.
3. Value subject matter not only as important in its own right but also as a vehicle for teaching students to think critically.
4. Value creative thinking applied to a knowledge base, recognizing that knowledge forms the backbone for creativity.
5. Teach students to apply their learning to practical, real-world problems.
6. Promote students' *dialogical thinking*—the ability to understand things from multiple viewpoints and to appreciate diversity.
7. Promote students' *dialectical thinking*—the understanding that what is “true” now may not be true in the future and may not have been true in the past.
8. Teach students to take personal responsibility for mistakes and learn from them.
9. Teach students to care about people other than themselves and to think about the effects of their actions on others and on institutions, both in the present and in the future.
10. Teach students to use their knowledge ethically, promoting universal values like sincerity, integrity, honesty, reciprocity, and compassion.

Changing Direction

Our society is moving in the wrong direction. If we continue to turn our schools into test-preparation centers, we are neglecting the important

three *Rs* of reasoning, resilience, and responsibility. What's more, test prep is not even an adequate way of teaching the first three *Rs*.

We need to educate students, not merely prepare them for tests. We need to immerse them in the full range of curriculum, including music, the arts, and physical education. We also need special programs that meet the needs of gifted students and those with developmental disabilities.

If we return to education rather than test preparation, we may find that students improve in both the first three *Rs* and the other three *Rs*. We must not just concentrate on the top, bottom, middle, or statistical average of the distribution. We must concentrate on *all* students and teach them how to be active, productive citizens in a rapidly changing world.

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Learning from World-Class Schools

Andreas Schleicher and Vivien Stewart

An increasing number of countries are setting a new standard of educational excellence. Here's what we can learn from them.

In a flat world, where everything is interconnected, relevant educational standards of excellence are no longer those of the city or state next door. Work that can be digitized, automated, and outsourced can now be done by anyone from any place in the world (Friedman, 2005). Countries that invest heavily in education to meet the demands of the new global knowledge economy benefit economically and socially from that choice.

Educators and governments are therefore paying increasing attention to international comparisons as they seek to develop effective policies to improve the performance of their education systems. The most comprehensive international benchmarks are those of the Organization of Economic Cooperation and Development (OECD), an organization of 30 member countries, including the United States. OECD's regular indicators enable policymakers to see their education systems in light of other countries' performance.

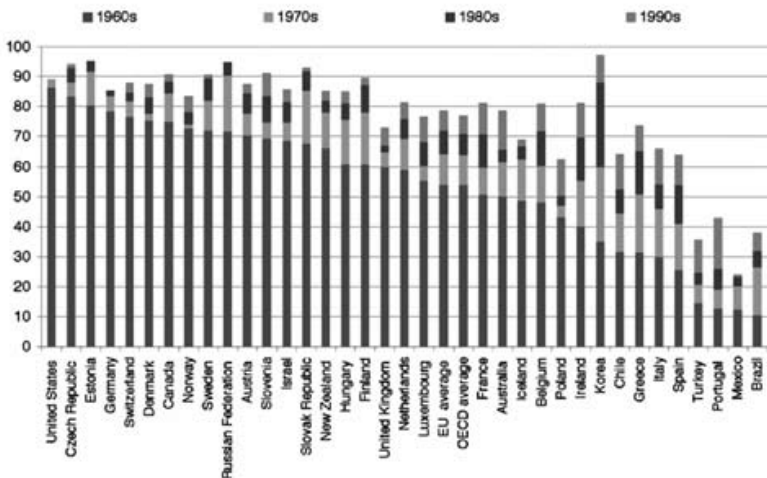
The World Is Catching Up

In the second half of the 20th century, the United States set the world standard of excellence. It was the first country to pursue and achieve mass secondary education and mass higher education. As a result, it

has the largest supply of highly qualified people in its adult labor force of any country in the world. This stock of human capital has helped the United States become the dominant economy in the world and take advantage of the globalization and expansion of markets.

However, what was once the gold standard—high school graduation—has now become the norm in most industrialized countries. According to the 2006 OECD data, the United States has fallen from 1st to 10th in the proportion of young adults with a high school degree or equivalent (including GED qualifications)—not because U.S. high school graduation rates dropped but because graduation rates rose so much faster elsewhere (see fig. 1). Looking at graduate output, the United States ranks only 18th among the 24 OECD countries with comparable data, with countries like Finland, Germany, Japan, and South Korea more than 15 percentage points ahead (OECD, 2008).

Figure 1. Percentage of People with High School or Equivalent Qualifications



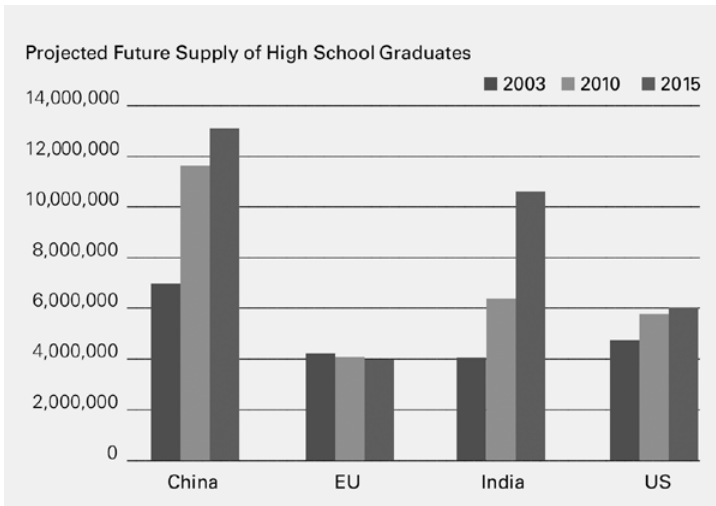
Source: *Education at a Glance: OECD Indicators*, 2008, Paris: OECD. Copyright 2008 by OECD. Reprinted with permission.

South Korea illustrates the pace of progress that is possible (Uh, 2008). Two generations ago, the country had the economic output of

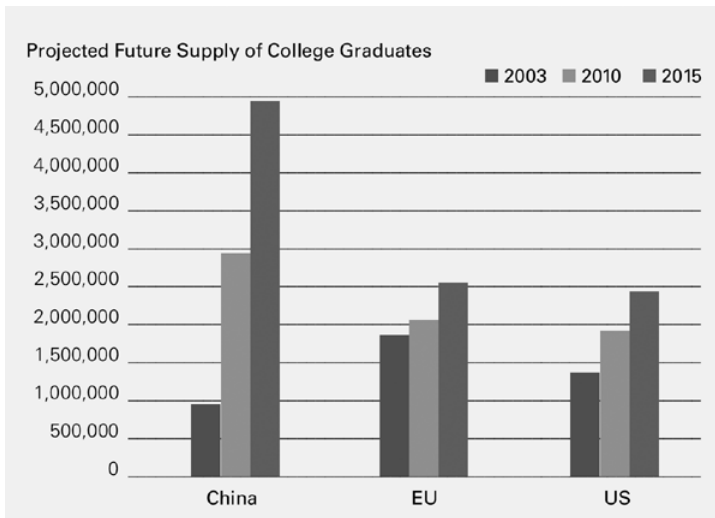
Afghanistan today and ranked 24th in education output among the current 30 OECD countries. Today, South Korea is the world's top performer in secondary school graduation rates, with 93 percent of an age cohort obtaining a high school degree, compared with 77 percent in the United States (OECD, 2008).

Although the United States has a strong higher education system compared with most other countries, here, too, other countries are passing the United States in the proportion of students completing college. The United States ranked second in 1995; by 2006, it ranked 13th among 24 countries with comparable data, behind such countries as Australia, Iceland, New Zealand, Finland, Denmark, Poland, the Netherlands, and Italy—and, for the first time, even behind the OECD average. In the United States, only 54 percent of those who enter college complete a degree, compared with the OECD average of 71 percent and Japan's impressive 91 percent.

The challenge to the United States has just begun. Looking ahead to 2015, the U.S. proportion of the global talent pool will shrink even further as China and India, with their enormous populations, rapidly expand their secondary and higher education systems (see fig. 2). Moreover, a larger proportion of these graduates will be in science and engineering (Asia Society, 2007).

Figure 2. Graduation Projections

Source: From "Education and the Knowledge Economy in Europe and Asia," by A. Schleicher and K. Tremblay, September 2006, *Challenge Europe*. Copyright 2006 by the European Policy Center. Available: www.international.edu.org/publications/EducationKnowledgeEconomy.pdf. Reprinted with permission.



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Lagging U.S. Scores

Another important set of indicators of education quality are OECD's measures of academic proficiency that show how 15-year-olds in the United States compare academically with 15-year-olds in other countries. Use of the Programme for International Student Assessment (PISA) has grown far beyond the 30 advanced-economy member countries of OECD; in 2006, 58 countries (OECD 2007a) that make up close to 90 percent of the world's economy took the PISA tests. Representative samples of between 3,500 and 50,000 15-year-old students take the test in each country. More than 400,000 students participated in the 2006 PISA, representing 20 million 15-year-olds. China is already participating in PISA on a pilot basis, and India is considering participation.

The PISA tests focus on the key subject areas of reading, mathematics, and science. They seek to assess not merely whether students can reproduce what they have learned, but also how well they can apply this learning to new settings. This reflects the increasing understanding that in rapidly changing knowledge economies, critical thinking and problem solving are important parts of the new global skill set, whereas the labor market demand for routine cognitive competencies—the kinds of skills that are easy to teach and test—has declined rapidly over recent decades.

Each country's score is an average of all students' scores in that country, and countries are ranked according to the average score of their students in each subject:

- *Science.* The United States ranks 21st of 30 OECD countries in science; the U.S. score of 479 fell well below the OECD average of 500. One-quarter of U.S. students did not reach the baseline level that will enable them to use science and technology in life situations. Although the United States does have an average level of top performers, it also has a much larger proportion than other countries of students who perform at the lowest levels. The difference in science scores between

students from different socioeconomic backgrounds is larger in the United States than in almost any other country (OECD, 2007b).

- *Math.* In 2006, the United States ranked 25th of 30 OECD countries in math; the U.S. score of 474 was significantly below the OECD average of 498. U.S. scores have changed little since 2003. More than one-quarter of U.S. 15-year-olds performed below the baseline level. The United States had a higher percentage of students in the top two proficiency levels, but even the highest-scoring 10 percent of U.S. students were outperformed by their OECD counterparts.
- *Reading.* In 2003, the United States ranked 15th of 29 OECD countries in reading literacy, with its score of 495 coming in near the OECD average of 500 (Lemke et al., 2005). A printing error invalidated the U.S. section of the 2006 PISA assessment, so the current U.S. standing is unknown.

So What Characterizes Excellence?

Perhaps the most important lesson we can learn from international comparisons is that strong performance and improvement are always possible. Countries such as Japan, Korea, Finland, and Canada display strong overall performance and, equally important, show that a disadvantaged socioeconomic background does not necessarily result in poor performance in school.

One thing is clear: Performance is not simply a matter of money, because only Luxembourg, Switzerland, and Norway spend more per student than the United States.

So what might we learn from high-performing nations that achieve more with less? The following key features play a substantial role in preparing these countries to meet the world's new definition of excellence.

Key Feature 1: High Universal Standards

Many countries have shifted away from control over education content to a focus on outcomes. This has driven efforts to more clearly articulate learning outcomes and translate these expectations into national education goals and standards. By setting national standards, countries seek to raise aspirations and define educational excellence, make educational objectives transparent to students, and provide a framework for teachers while avoiding the risks of narrowing the curriculum and teaching to the test.

Countries vary, however, in how they achieve these key features. Some countries, like Finland, have broad standards and give teachers a great deal of discretion regarding how to reach them. Others have also introduced performance benchmarks that students at particular ages or grade levels should reach en route to mastery of the standards. England, for example, defines average student performance at the end of each “key stage.” In South Korea, Japan, and China, everything is clearly aligned to the standards, from teacher preparation and professional development to textbooks (Asia Society, 2006).

Whatever the format, national or common standards cannot drive change by themselves, nor should they just sit on a shelf. They must be understood and supported throughout the education system by teachers, schools, students, teacher-training institutions, and education publishers.

Key Feature 2: Accountability and Autonomy

Many successful education systems couple the focus on universal standards and outcomes with efforts to move responsibility to the front line, encouraging responsiveness to local needs and strengthening accountability systems. In fact, in most of the countries that performed well in PISA—such as Canada, Finland, and Japan—schools now have substantial autonomy with regard to adapting and implementing education content and allocating and managing resources. The strongest

effects on outcomes seem to be where schools have substantial control over two key areas—budgeting and hiring.

There are also striking differences in approaches to accountability. In recent years, the United States has focused heavily on external test-based accountability. Asian systems rely on external examinations, and England has focused on the use of pupil performance data, school inspections, and value-added analyses. By contrast, Denmark and Finland, with their focus on formative assessment and school self-evaluation, rely less on external accountability mechanisms and more on building capacity for and confidence in professional accountability. The primary purpose of any systematic assessment of school performance in these countries is to reveal best practices and identify shared problems in order to encourage teachers and schools to develop more supportive and productive learning environments.

Key Feature 3: Strengthened Teacher Professionalism

High-performing countries recruit strong teacher candidates, promote sound subject-matter preparation, offer induction programs that support new teachers during their first few years of teaching, and offer ongoing professional development. These countries are abandoning the traditional factory model, with teachers at the bottom of the production line receiving orders from on high, to move toward a professionalized model of teachers as knowledge workers. In this model, teachers are on a par with other professionals in terms of diagnosing problems and applying evidence-based practices and strategies to address the diversity in students' interests and abilities. Countries vary in the extent to which they use higher salaries as an incentive (for example, Korea does, Finland doesn't); open the market to new teacher-training providers (as in England); and make tradeoffs between class size and time for professional development (McKinsey & Co., 2007).

Singapore is an excellent example of best practices. Singapore recruits teachers from the top 30 percent of each high school class,

provides financial support for their initial training, gives teachers 100 hours per year of professional development, and offers a choice of three career paths—master teacher, content specialist, or principal (Asia Society, 2008; Ban Har, 2008).

Key Feature 4: Personalized Learning

In all school systems, there is a correlation between student socioeconomic status and performance, but systems vary enormously in the extent to which socioeconomic status predicts such performance. In virtually all the countries that performed well in PISA, schools and teachers are responsible for engaging constructively with the diversity of student interests, capacities, and socioeconomic contexts. They don't have the option of making students repeat the school year—retention is not permitted—or of transferring students to schools with lower performance requirements. Even where retention or transfers are technically possible, the incentive structures for teachers and schools encourage teachers to address and solve challenges rather than hand them to others. The mechanisms for this vary. In Sweden, for example, school funding formulas link additional resources to the magnitude of the challenges that schools face; in Finland, schools organize more than one-fifth of student learning time outside formal classroom settings.

Although not yet a top performer, Poland underwent a significant reform of its school system in 1999, which included delaying stratification to age 16, reorganizing teacher support and professional development, and changing the distribution of decision making in education. As a result, the country experienced three-quarters of a year's growth in its reading scores on PISA by 2006. East Asian systems such as those in Japan, Korea, Hong Kong, and Taipei, Taiwan, are relatively meritocratic; students' socioeconomic background has little effect on students' success. In Finland, multiple levels of academic and social support both inside the classroom and outside the school ensure that no child falls far behind. Some European countries with large immigrant

populations—such as Switzerland and Lichtenstein—are more successful than the United States in educating immigrant students, particularly in the second generation. More generally, there is no correlation between a country's share of immigrant students and its performance on the PISA assessment.

Many of the high-performing systems are seeking to move from prescribed forms of teaching, curriculum, and assessment toward an approach predicated on enabling all students to reach their potential. Of course, many schools and teachers in the United States have tailored curriculum and teaching methods to successfully meet their students' needs. However, what distinguishes the education systems of, for example, Victoria in Australia, Alberta in Canada, or Finland is the drive to make such practices systemic by establishing clear learning pathways and fostering independent and lifelong learning among students. Obviously, such personalized learning demands a curriculum that provides both breadth of study and personal relevance.

Some countries also show that excellence can become a consistent and predictable education outcome: In Finland, the country with the strongest overall results in PISA, the performance variation among schools amounts to only 5 percent of students' overall performance variation. Parents can rely on high and consistent performance standards in whatever school they choose to enroll their children.

So What Does It Mean?

Some people criticize international education comparisons, such as PISA, pointing out that the United States has had mediocre performance on international tests since *A Nation at Risk* first issued its warning in 1983—but that the country has still prospered economically. Although this observation is true in some respects, it fails to take into account the time lag involved between a nation's stock of human capital and its economic output. Also, the United States has an extremely favorable economic “enabling environment” of legal and banking systems, a

large supply of capital, a culture of freedom, and systems that support entrepreneurialism. These factors can, to some extent, compensate for weaker K–12 education systems (Asia Society, 2007; Hanushek, 2008). However, although the U.S. economy has grown overall, large sectors have moved irreversibly to other parts of the world.

The overarching reality is that in today's world, a global marketplace of ideas exists in every field, including education. No nation has a patent on excellence. All are striving to modernize their education systems to meet the demands of the global knowledge economy and produce a new global skill set.

The United States has much to offer in these discussions—from its research on child development, to its institutional and instructional innovations, to its more “creative” culture. It also has much to learn from other countries in which educational excellence is more systemic. Success will go to those countries that are swift to adapt, slow to complain, and open to change (Schleicher, 2006).

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Creating Excellent and Equitable Schools

Linda Darling-Hammond and Diane Friedlaender

The right design features and policies can promote exceptional high schools on a broad scale.

A business maxim holds that every organization is perfectly structured to achieve the results it achieves. We could say the same of schools. And when outcomes are particularly problematic—as is true for many large urban high schools that lose most of their students before graduation—attaining substantially different results in our schools will require more than just teachers “trying harder” within traditional bureaucratic constraints. Such a shift typically requires new organizational structures.

Some high schools that have made those changes offer an education that not only helps students achieve academically but also can dramatically transform students’ life prospects. Take the case of James Williams.¹ As a young black male moving from one low-income neighborhood in San Francisco to the next, James faced the kind of challenges that lead many young people to drop out of school. His mother, who experienced health problems, was out of work for several years and struggled to raise a family on her own. Although James was raised around drug use and alcoholism, he never succumbed to gang violence or street life and always wanted to go to college.

However, college seemed like a far-off dream. James could not get into any of the college-preparatory high schools in San Francisco, so his mother decided to enroll him in a new small high school—June Jordan

School for Equity. The school combined a college-preparatory curriculum organized around social-justice issues with highly personalized instruction and a strong advisory system. With two other young children to care for, James's mother could not easily attend parent conferences, so June Jordan teachers went to her home. James's advisor provided emotional, academic, and even financial support to help him get through rough patches when his family faced a number of hardships.

James developed a passion for writing as a result of the school's continual emphasis on writing and inquiry. Now a freshman at the University of California, Santa Cruz, he is considering a major in literature or writing. He noted,

June Jordan got me ready for a four-year college. ... we had a lot of help, and people had our backs at June Jordan, but they also made sure that we were able to take care of ourselves when we needed to. ... My life is just beginning, and it was a great thing to have June Jordan to start.

High Schools for Equity

James's story reflects those of many other students attending one of five California high schools we recently studied that have beaten the odds in supporting the success of low-income students of color (Friedlaender, Darling-Hammond, et al., 2007). The schools—Animo Inglewood Charter High School (Los Angeles); Stanley E. Foster Construction Tech Academy (San Diego); June Jordan School for Equity (San Francisco); Leadership High School (San Francisco); and New Technology High School (Sacramento)—are located in California's largest cities and are nonselective in their admissions, yet they have graduation and college-going rates significantly higher than the state average. A majority of the student body in each school is composed of low-income students of color.

All five schools have developed innovative settings and practices that offer distinctive opportunities for learning. For example, Animo

Inglewood offers a rigorous college-preparatory curriculum coupled with strong academic supports to ensure that all students meet high expectations. Animo's equally high expectations for its teachers are reflected in its intensive professional development model based on that of the National Board for Professional Teaching Standards. Construction Tech Academy integrates academic study in college-preparatory courses with applied projects and internships in construction, engineering, and architecture.

June Jordan School for Equity provides its students with a project-based college-preparatory curriculum infused with social-justice and civic-engagement themes. Students participate in community-service internships and complete portfolios of their work that they present in exhibitions. Leadership High School focuses on creating community leaders by infusing the core values of critical thinking, effective communication, and personal and social responsibility throughout their college-preparatory curriculum and portfolio assessments. Staff members also take considerable time in professional learning communities to analyze student work and other data with the goal of ensuring equitable outcomes for all students.

New Technology High School offers fully implemented interdisciplinary, technology-intensive project-based learning that is completed in self-directed small groups. Students supplement their learning at New Tech High, as they do at the other four schools, by taking several classes at the local community colleges.

These schools are, in many respects, anomalies in the current landscape of secondary education: All of them send 80 to 100 percent of their students to higher education, exhibiting college-going rates more than twice the state averages for the kinds of students they serve. Equally important, these schools engage students in intellectually stimulating, relevant, and personalized learning that empowers them to contribute to their communities and learn throughout their lives.

The High Schools for Equity study, conducted by the School Redesign Network at Stanford University in collaboration with

Justice Matters Institute (Friedlaender, Darling-Hammond, et al., 2007), describes the school practices that support this extraordinary student success. The study also focused on the policies needed to develop and maintain such schools on a broader scale so that they become the norm rather than the exception for students of color.

Successful—By Design

The 20th-century factory model remains the pervasive model for high schools in the United States, especially in cities. Factory-model schools were designed to process a great number of students efficiently, selecting and supporting only a few for “thinking work” while tracking others into a basic-skills curriculum aimed at preparation for the routinized manufacturing jobs of the time. These schools favored size and specialization over strong relationships. They assigned thousands of students to a single building, sending them to a different teacher for each 50-minute class period; they assigned teachers to 150 or more students (and more than 200 students in some California cities); and they organized teaching as an isolated activity, with little time for teachers to plan and work together on supporting students or designing a coherent curriculum.

The schools in our study operate quite differently. Located in varied urban communities, serving different student populations, and operating within different policy contexts, all five schools nevertheless have a number of design features in common.

Personalization

A key feature of all five schools—perhaps the most striking in contrast to the traditional urban high school—is their degree of personalization. Said one community organizer at June Jordan, “When kids are slipping, there’s this expectation that teachers grab hold of them and will not let go.” The schools’ efforts in this respect include constructing small learning environments; fostering continuous, long-term relationships between adults and students; and creating advisory

systems that systematically organize counseling, academic supports, and family connections.

In each school, teachers have an advisory group of 15 to 25 students who meet with them several times a week and, in most cases, stay together from two to four years. The advisor works closely with the family, other teachers, and the student to ensure availability of the needed academic and personal supports. “We build a really close family relationship [in the school],” said the principal of Animo Inglewood. “Students work hard not to let the family down.”

To provide personalization, these schools have redesigned traditional staffing to hire more classroom-based staff, thus enabling them to maintain smaller class sizes and reduced pupil loads for teachers. The average class size is 25 students, with each teacher having a pupil load of between 50 and 100 students. Teachers also teach fewer students for longer blocks of time. By knowing students well, teachers are more able to tailor instruction to students’ strengths, needs, experiences, and interests.

Personalization substantively influences students’ investment in learning by nurturing strong relationships and accountability between students and teachers, both in the classroom and through advisory periods. As one Construction Tech student expressed,

The whole small schools thing really helps because of the teacher/student relationship. ... You get to interact with your teachers a whole lot more and get to know them. When you’re learning from a friend, not just some random person, it’s a lot easier to learn.

Rigorous and Relevant Instruction

Each of the five schools has designed a rigorous, coherent instructional program that enables all students to overcome barriers often associated with race, poverty, language, or initially low academic skill. All establish high expectations, link performance assessments to clear

standards, and teach intellectual and research skills in the context of rigorous coursework that has been made relevant through application to real-world problems.

Consider the case of Eduardo Rodriguez. As a student in special education, he had managed to progress through the school system reading at only a 5th grade level; for a considerable time, he could not spell his last name. When he was in 10th grade, he attended a chaotic public high school that was unable to meet his needs. “He wasn’t learning; he wasn’t reading,” his mother explained. “The school just didn’t expect anything of him.” When Eduardo was almost stabbed while trying to defend a student who was about to be attacked, his mother decided to pull him out of school. She believed that if she didn’t, either someone would kill him or he would end up in prison.

Mrs. Rodriguez tried to enroll Eduardo in private school, but he could not pass the entrance requirements. When she found out about New Tech High School and went to visit in 2004, she was impressed with how courteous and articulate the students were. She enrolled her son even though the school was a 45-minute drive from her home. Mrs. Rodriguez warned the principal and the counselor that her son was unlikely to ask for help or talk to the teachers.

However, as the staff reached out to him, Eduardo soon developed close relationships with his teachers and his counselor, whom he calls regularly, including during holiday breaks. His reading level has risen six grade levels, and he is now nearly on par with his current 11th grade placement. He writes enthusiastically and has developed close friendships with other students. As his mother explained,

It’s expected of him to perform. It’s not, “We’ll see if you can do it,” but, “You can do it and you’re going to do it.” So he thinks like that now.

The schools connect students to their communities and their futures through community service, internships, and partnerships with community groups and local colleges. Authentic learning experiences

connect to the world outside school. For example, students may complete a project determining the fuel economies of gas-powered and hybrid-powered vehicles, which they then present to a panel composed of their parents. Ambitious research projects—such as studying, designing, and building an ecologically sensitive scale model of a zoo for various species—require students to investigate problems, find and organize resources, develop designs and products, and present their results orally and in writing to a range of audiences.

Most of the schools require the completion of portfolios for graduation; these typically include students' exemplary work across domains, such as literary analyses, original scientific investigations, social science research, demonstrations of mathematical concepts in an applied setting, and artistic exhibitions. Students must often present their research before a jury of teachers, parents, peers, and reviewers from outside the school.

If students don't get a passing score on the multidimensional rubric that reflects the standards, they must present their work a second time. One San Diego district official who participated in a jury recalled an exhibition in which the student wasn't prepared. The student admitted it, and one committee member said, "Well, son, what is it going to take next time?" The student, who acknowledged the reasons for his failure and came to understand what it would take to succeed, became successful and now has graduated and moved on to post-secondary education.

Teachers provide students with opportunities to revise their work in response to teacher feedback as well as feedback from peers and outside experts. The schools provide additional classes and tutoring to help students close skill gaps, especially students who enter high school performing below grade level, new English learners, or students in special education. Both students and educators see this performance-based instruction and assessment as more powerful and rigorous than traditional schoolwork based on textbooks and tests. Said one student at Leadership High,

At other high schools, it's just "you passed." Kids can't tell what they got out of high school. Students here know what they've learned.

Professional Learning and Collaboration

The five schools in our study allocate considerable time for teachers to collaborate, design curriculum and instruction, and learn from one another. They organize extensive summer learning opportunities and retreats to look at evidence of student learning and to plan and organize instruction, advisory practices, and student supports. Said a counselor at Leadership High,

Everything is very intentional here. At other places I've worked, it's like, "Let's try this. Let's try that." Here, we look at the research; we look at the data and figure it out. There are reasons for everything.

Overall, the schools allocate 7 to 15 days to shared professional learning time throughout the year. In addition, they organize substantial time during the week—usually several hours—for teachers to plan and problem solve together. With teachers meeting regularly in grade-level teams, the schools have venues for examining student progress, creating a more coherent curriculum, and enabling teachers to learn from one another. Planning within departments also occurs regularly, and teachers develop curriculum and assessments that prepare students to meet common schoolwide outcomes.

Mentoring and coaching systems for new and veteran teachers also augment professional learning. In staff meetings, teachers engage in focused inquiry about problems of practice—such as how to improve curriculum or attendance or meet the needs of individuals or groups of students. To learn about student thinking, standards, and curriculum, teachers collectively evaluate student portfolios, projects, and exhibitions.

In small schools with school-led professional learning, the line between professional learning and school leadership and decision making is often blurred. All the schools use models of democratic decision making and engage teachers in a range of leadership roles, including mentoring new teachers, leading professional development, running the performance-based assessment systems, developing advisory curriculum, conducting data analyses, determining a schoolwide instructional focus, and helping manage the day-to-day logistics of running the schools. Shared governance often involves students, parents, community members, and industry leaders, which supports widespread commitment to the vision and mission of the school. For example, at June Jordan, parents, students, and staff meet regularly to ensure the school is meeting its mission, to discuss program plans, and to advocate to the school district on behalf of the school.

Collaboration has a positive influence on teacher morale as well, as one teacher at Animo Inglewood explained:

I can't imagine working in a big school district and feeling like I'm pushing a rock up a hill. It's nice to know everybody on staff is pushing that same rock because we have the same kids.

A Need for Policy Changes

In our research, we identified four policy areas that influence the ability of high schools to construct practices that enable students of color to succeed. In some cases, the schools in our study benefited from specific policy supports. In others, they succeeded despite lack of supports that would be needed for more widespread reforms to take root.

Policy Focus 1: Organization and Governance

The schools benefited from policies that encourage the creation of new small high schools designed to offer the personalization and instructional supports needed to create more successful learning.

Schools needed extra funding to support start-up costs associated with planning the new design, recruiting and developing staff, securing facilities and equipment, and growing to a level that supports scale economies. These school-design efforts were supported by small schools grants from the state and federal governments as well as foundations.

However, the policy environment has not provided steady support for the continuation of this work. Grants end, and local budgets are often inadequate to support essential features of the schools' work—especially their professional learning needs—without continual outside fund-raising. Thus, we recommend that states and the federal government

- Expand grants to support new schools and small learning communities whose designs promise to attend more effectively to students' needs and increase their success.
- Create a means for documenting and sharing effective school organizational and instructional practices through clearing-houses and networks that enable schools to learn from one another, like the school networks established by reformers in New York City and Boston.
- One crucial aspect of the governance problem is the extent to which the education system relies on *bureaucratic accountability*—that is, on regulations that prescribe and manage what schools do—or, alternatively, on *professional accountability*, which strives to develop knowledgeable educators who can be trusted to make responsible decisions about practice. The ongoing tug-of-war between bureaucratic control and autonomy cannot ultimately be resolved without investments in school capacity and professional knowledge and skill. The autonomies regarding hiring, professional development, curriculum, and assessment that these schools rely on to construct more powerful learning environments are not likely to

be granted unless the public has a high degree of confidence that the schools will make defensible decisions.

- The goal is not only to support a vanguard of uniquely situated schools, but also, eventually, to enable *all* schools to adopt practices that will be more successful for all their students. The success of these vanguard schools and the transformation of others will rely on investments in schools' capacities and changes in the current regulatory and funding structure for education. These investments include
- Teacher preparation and development to enable the kinds of instructional strategies and advisement responsibilities that teachers have taken on in these new models.
- School leader recruitment and development to hone principals' skills in instructional leadership, organizational design, and change management.
- A system of curriculum, assessment, and instruction that encourages the development of 21st-century skills and that is both rigorous and relevant.
- Funding streams that are sufficiently flexible to enable strategic investments in innovative approaches.

Policy Focus 2: Human Capital

The schools we studied succeed in part because of their ability to recruit and develop strong teachers. However, there is a substantial shortage of teachers who are armed with the kinds of skills needed for the sophisticated pedagogies used in these schools and who are available to teach in urban districts. Once teachers are working in schools, they need ongoing, high-quality opportunities for learning that focus on concrete problems of practice in the content areas they teach with the specific students they serve. Although some states have initiated programs to address these concerns, such programs often come and go with budget shifts, creating a yoyo diet of initiatives rather than a steady

set of policy supports for developing high-quality teaching in all schools. To address these needs, federal and state governments should

- Completely underwrite high-quality preservice preparation for candidates who will teach in high-need schools. Strategies might include creating or expanding service scholarships and forgivable loans for individuals who prepare to teach in low-income schools, with special incentives for teachers with language skills and content backgrounds that are in short supply.
- Provide support for improving the capacity of teacher education programs. Teachers need to know how to provide rigorous, relevant, and responsive instruction to low-income students of color. Essential teacher skills include teaching content to diverse learners—including new English learners and those with learning differences—and designing an engaging and relevant hands-on curriculum.
- Provide funding for at least 10 days of professional development each year. As all high-achieving nations do, the U.S. federal and state governments should fund learning time for teachers. Schools should have flexibility to determine how to use this time.
- Support high-quality professional development in the specific areas teachers need to be effective. This includes increasing support for sustained, curriculum-focused professional learning institutes as well as coaching models that help teachers put ideas into practice.
- Support training for professional development providers and mentors to ensure they learn about successful methods of teaching students of color and English language learners. Such training should include teachers helping other teachers acquire these skills.

- Provide time for planning and collaboration so that teachers can develop coherent, high-quality curriculum and learn from one another.

In addition to having adequately prepared teachers, schools also need well-prepared principals who are strong instructional leaders. Principals need to know how to plan professional development, redesign school organizations, and manage a change process. In addition, they need to know how to organize staffing and teacher time to reduce class size, create teams, incorporate advisory systems, and provide time for collaboration and professional learning opportunities. To develop such leaders, research (see Darling-Hammond, LaPointe, Meyerson, Orr, & Cohen, 2007) suggests that states should

- Recruit dynamic future leaders into the principal pipeline. Subsidize high-quality preparation—including paid internships under the guidance of expert principals who effectively lead schools serving students of color—for candidates who have strong instructional and leadership capacities and who reflect today's students.
- Provide support for systematically improving principal preparation programs and developing clinical experiences and content that prepare principals to lead in schools that are organized in new, more productive ways.

Policy Focus 3: Curriculum and Assessment

Although the schools we studied give their students access to a college-preparatory curriculum, they also offer more innovative learning opportunities. The schools' forward-looking curriculums rely both on redefining traditional requirements and on using challenging performance-based assessments that demand applications of knowledge, provide students and staff with timely feedback about students' progress, and support revision of student work to meet standards of

quality. Collectively scoring assessments—such as juried portfolios or performance tasks—also helps teachers construct shared ideas about what constitutes good work and discuss how to improve curriculum and teaching.

The performance assessments the five schools use resemble those used in high-achieving countries, such as Finland, Hong Kong, Canada, and Australia. There, local assessments require students to conduct research and scientific investigations, solve complex real-world problems, and defend their ideas orally and in writing. Such assessments promote serious intellectual work. Although the schools in this study attend to the demands of California's accountability system, they find that the state's multiple-choice tests do not promote the kind of 21st-century learning that enables students to find and use resources, analyze and synthesize information, produce and explain ideas, apply knowledge to novel situations, use new technologies, and work productively with others.

If more schools are to create strong curriculums oriented to their students' and society's future, as well as assessments that prepare students for college and the workplace, state and local policies must evolve to support these efforts. States should

- Rethink traditional curriculum requirements to more fully acknowledge modern conceptions of learning and curriculum, including interdisciplinary and applied learning that incorporates new technologies.
- Improve assessment systems and encourage performance assessments at the state and local levels, including appropriate assessments for English language learners.

Policy Focus 4: Funding

To provide a rigorous, relevant, and responsive education to low-income students of color, the schools we studied were required to raise additional funds beyond those the state provided. This was particularly

necessary in a high-cost-of-living state that spends far less than the national average on its schools. The schools studied spend these funds on hiring additional core staff, funding professional development, and purchasing books and materials. Still, four of the five schools have no library, and three lack a gymnasium. Several share buildings with other schools and have little common space or outdoor space for students. The urban districts that sponsor them have struggled, like many across the United States, with the lack of investment that has occurred as a result of growing inequities in spending during the past two decades.

Moreover, schools serving low-income students lack flexibility in using the funds they *do* have to best serve their students. All the schools in this study achieve an integrated system of support by reallocating resources to reduce pupil load and class sizes, instituting an advisory program, and monitoring academic achievement. In spite of these efforts, the schools are still hindered by the state's fragmented funding streams. Aside from their state per-pupil funding, much of the funding that schools receive comes in small categorical dollops for additional programs and is often insufficient.

This fragmented, overly prescribed allocation of funds gets in the way of schools carrying out their vision and undermines their efforts to provide meaningful supports for students. It can also create a set of unglued programs that detract from a core instructional focus. To better address the needs of currently underserved students, states and the federal government should

- Increase and equalize funding for schools by establishing weighted student funding formulas in which funds follow the student and additional funding is allocated for students with the greatest needs.
- Create less-fragmented funding streams. With the exception of major programs intended to address specific population needs (for example, special education and English language learners), reduce the number of small programs and roll funds into

core funding through the weighted student formula so that schools have more flexibility to align funding to their instructional missions.

Dismantling Inequities

This study offers examples of high schools that are challenging the status quo by providing opportunities for low-income students of color to become critical thinkers and leaders. Unless policy systems change, however, these schools will remain anomalies rather than harbingers of the future. The policy changes we propose could create a context in which the kinds of schools we describe become the norm and all students, regardless of race, income, or zip code, have the right to learn.

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¹ Student names are pseudonyms.

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Why We Run Our School Like a Gifted Program

Linda Conlon

*This high school makes enrichments formerly
reserved for gifted kids available to all.*

Brad's¹ record indicated extraordinary ability buried beneath learning disabilities and a host of emotional problems. New to our small public high school, Brad was angry, despondent, and ready to drop out—or to collect enough disciplinary infractions to be expelled.

One day, a teacher noticed Brad's T-shirt advertising a local motorcycle shop and the glimmer in his eye at the mention of it. After school, she stopped by the shop to ask whether they would offer an apprenticeship to an intelligent student who loved motorcycles. The owner was willing to give Brad an opportunity; we at Quaker Valley High School were willing to let him leave school two hours early and earn school credit for his apprenticeship. The changes in Brad's attitude and achievement were remarkable. He eventually graduated from high school and enrolled in a community college with the goal of earning a degree and owning his own business.

At Quaker Valley High, we can coax out excellence from a student like Brad because we believe that educational interventions often reserved for students expressly labeled “gifted”—such as flexible scheduling and the chance to pursue their learning interests—should be available to all our students. We've found that giving all students

opportunities to excel and control their own learning makes our school both equitable and excellent.

Clearing the way for an ambitious but previously undistinguished student at Quaker Valley to tackle trigonometry led to a similar blossoming. Nakia aspired to be a doctor, but she realized her course trajectory would not allow her to take a calculus class before graduation. She approached the principal with a proposal to work through an honors-level trigonometry course over the summer, requesting only that we give her the book the class would use and the green light for finding a tutor.

School staff members had doubts but supported Nakia's efforts. We gave her a list of requirements and a date to sit for the final exam, and we encouraged her to go for it. We were surprised and delighted when Nakia passed. Our "late bloomer" is currently in medical school.

Making the Commitment

Quaker Valley, like many suburban schools with a small percentage of low-income students, is not at risk of failing to meet adequate yearly progress goals. We serve many students, however, who need extra support to achieve proficiency. By aligning our practices to the standards of high-quality gifted education, we have ensured that our commitment to help certain students meet proficiency standards does not come at the expense of providing a substantial, challenging education to *all* our students—who all deserve the best possible education.

In a national climate of minimum expectations and high-stakes testing, Quaker Valley High has chosen to run the entire school like a gifted program. The only difference between our school and a high-quality gifted program is that all our classes, activities, and services are open to any student. We've reshaped school curriculum and modified our learning structures, using as a guide best practices in gifted education—providing rigorous curriculum, differentiated instruction, personalized

counseling, and enrichment opportunities that tap students' interests (Landrum, Callahan, & Shaklee, 2001; Renzulli, 1998).

Ten years ago, the Quaker Valley School district began its efforts to open up resources and opportunities previously reserved for gifted students to all the students in the school. We asked ourselves, Is it possible to provide gifted education without identifying gifted students (Borland, 2005)? Can a focus on maximizing everyone's potential lead to higher achievement? We decided to find out.

Our district superintendent was strongly behind this effort, as was our principal, who champions equitable opportunity and expects teachers to be creative problem solvers. But we found teachers to be apprehensive, especially when we made the decision to open enrollment in advanced placement classes to all students. Teachers feared that too many students would reach beyond their ability, average scores on advanced placement tests would plummet, and teachers would take the blame. The superintendent gathered Quaker Valley's teachers together and assured them that the changes would bring a payoff for a broad range of students and that teachers would not be penalized for bumps along the road.

As we've offered opportunities to a broader group, we've realized that few educational interventions—from curricular modifications to community experiences—can justifiably be reserved for students with unusually high IQ scores. Teachers are gratified by the change in school culture. And we've made two happy discoveries: (1) all our students, not just the usual suspects, have considerable untapped potential; and (2) the time saved in the process of identifying who should be labeled "gifted" is better spent in providing additional services to more students.

Building in Rigor—for Everyone

Because strong curriculum is the raw material of high-quality gifted programming, Quaker Valley offers as many advanced placement courses

as possible. We also aim for the depth of content typical of advanced placement (AP) classes in all core subjects, world languages, and the arts. Even though not all students will achieve at the AP level, this level is our benchmark. We used the backwards design process (Wiggins & McTighe, 1998) to build high expectations into our curriculums in all classes.

When we opened the doors to advanced placement classes, there was no stampede, but a steady trickle of students surprised us by rising to the demands inherent in each class. We counsel students about recommended prerequisites and the work ethic necessary to succeed in such classes; however, no student is denied admission. Students often discover that our advice of “not yet” rather than “no” was well founded. Often enough, however, they prove us wrong, perhaps simply because they were offered the chance.

Keith, for example, was a student who did not appear destined for honors courses but showed his true mettle when teachers met him halfway. Keith flew under the radar—compliant, but with mediocre grades and only sporadic sparks of brilliance. Teachers suspected there was more to Keith than his grades indicated. When he took the PSAT, which we administer to all 9th and 10th graders, he scored near the top of the class. Our teachers recognized the full extent of his selective achievement and looked more closely.

Keith’s math teacher noticed that his performance on tests was consistently strong but that Keith never did his homework. Recognizing that perhaps Keith did not need the reinforcement that homework problems provided, she crafted a learning contract. Keith was permitted to choose when to do homework and when to decline. After we made this minor adjustment in control over his learning, Keith’s grades and attitude toward school soared.

Providing Flexible Scheduling

To encourage each student to reach for excellence, we are flexible with traditional class time, subject and grade acceleration, and curriculum

compacting (Colangelo, Aussooline, & Gross, 2004; Tomlinson, 1999). For example, Chloe had skipped a grade in elementary school and finished the three-year middle school program in two years, traveling to the high school for advanced math and science classes. She was capable of handling far more than our six-period day would allow. She asked whether, instead of choosing between two of our single-section advanced placement courses that were scheduled during the same period, she could take them both. Teachers helped her craft a plan to attend class as needed, and Chloe earned top scores on the AP exams for both courses.

We have extended such flexibility to youth with fine arts talent. Dana was an incredibly gifted musician. We reasoned that if a strong academic student could master two classes in half the time needed by most students, couldn't a musician do the same? We permitted Dana (and others) to schedule instrumental and choral music classes simultaneously. Dana met the challenge of learning and rehearsing the major performance pieces featured in both courses. As a result, her repertoire became so extensive that she gained acceptance to a highly competitive college, majoring in music.

As a small school, we can't offer multiple levels of all courses, so we occasionally provide creative solutions to meet student needs. For example, we offer some AP classes through an online provider, and we allow some motivated students to pursue AP content by designing guided-study "road maps" that prepare them for the exams. We've created dual-enrollment opportunities through a local community college and a nearby art institute. It's interesting that this dual-enrollment program draws few participants from our advanced classes but engages many students who may not previously have seen themselves as college bound.

Neither of our two physics options—one at the basic level and one an AP class—were optimal for our students who were academically strong but who did not have the need or time to devote to a college-level science class. In the past, such students enrolled in the basic physics

class and patiently waited while the teacher covered math concepts they'd already mastered. No one, including the instructor, was satisfied with this arrangement.

So we arranged to send these students who were between the basic and AP levels to the library when the rest of the class was reviewing content that these learners had down cold. Each week, these students consulted the teacher's Web site to see what concepts would be covered, which labs were scheduled, and when tests or quizzes would be given that week, and they chose which days to attend (with labs and assessment days being mandatory). Accountability was built into the arrangement: Students signed an agreement to work in the library during any physics period they chose not to attend, and their entire grade was based solely on tests, quizzes, and labs. This way, the teacher could devote more time to students who required direct instruction or a slower pace. The stronger students flourished with this freedom, learned how to manage their time, and took responsibility for their own learning.

Connecting Enrichment to Students' Interests

All our students take advantage of career and college planning, a service-learning program, entrepreneurship opportunities, and help with scholarships or summer programs. Many Quaker Valley student competitive activities were once restricted to students labeled "gifted." Now all students can compete for academic teams, with decisions made by merit rather than identification status.

Take the example of Tony, a struggling student who learned to play chess. When the chess club held its playoff for the right to represent our school in the county gifted program's chess tournament, Tony secured the last seat on the team by default. As the only student not identified as gifted to participate, Tony astounded everyone when he won several matches.

All students at Quaker Valley complete individual graduation projects; we encourage them to work on something original and of strong personal interest. Many projects resemble the Type III Individual or Small Group Investigations that are part of Joseph Renzulli's (Renzulli & Reis, 1985) Schoolwide Enrichment Model of gifted education. We match each student to one of a districtwide pool of faculty mentors by mutual interest in the topic. We counsel students to choose a project that "doesn't feel like school"—anything from event planning to original music composition. Our goal is not only to evaluate skills, but also to promote self-direction, creativity, and interest in potential fields of study or careers.

Scott was interested in helping children with disabilities and had studied successful therapies involving pets. For his graduation project, Scott trained his Labrador retriever puppy as a therapeutic guide dog and earned certification for his pet. He began volunteering weekly in our self-contained special education class, teaching his dog to interact with some highly challenged middle school students. Scott found this experience so rewarding that he continued his weekly sessions until graduation.

The services we offer Quaker Valley's students encourage high standards in learning for students who may never have experienced such encouragement—without, for the most part, affecting our budget. These changes required only an attitude toward accommodating students that does not depend on testing and labeling them *before* meeting their needs.

No Child Left Behind is a fact of modern life; teachers feel strong pressure to define achievement by its tenets of minimum competency. But the pursuit of proficiency should not define school culture. If schools act on the fundamental belief that all students can achieve at high levels, as we have at Quaker Valley, we'll reduce the danger of settling for less.

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Part 2

Offering a
Rigorous Curriculum

The Thought-Filled Curriculum

Arthur L. Costa

Everyone thinks. Keeping five themes in mind will ensure that every learner thinks skillfully.

How do you know that your students need to learn how to think?

When I have posed this question to teachers of all grade levels in countries around the world, teachers have given surprisingly similar and consistent descriptions of their students' thinking:

- They just blurt out answers. They should think before they respond.
- They depend on me for their answers. I wish they would think for themselves.
- They give up so easily on difficult tasks. I'd like them to hang in there.
- They can't seem to work in groups. They must learn to cooperate and work together.
- They don't apply their knowledge. I want them to use what they know in other situations.
- They are afraid to take risks. I'd like them to be more creative, more adventuresome.

Such comments reflect teachers' awareness that to function in school, at work, and in life, students must persist when faced with adversity, solve cognitively complex problems, draw on vast reservoirs of knowledge, and work collaboratively. To strengthen these skills,

instruction must become more reflective, complex, and relevant (Commission on the Whole Child, 2007). Curriculums must become more thought-filled in the sense of enlarging students' capacities to think deeply and creatively.

Five Themes to Shape Curriculum

I propose that educators make five themes part of any thought-filled curriculum. These themes provide lenses through which we can shape, organize, and evaluate curriculums.

1. Learning to Think

Iron rusts from disuse; stagnant water loses its purity and in cold weather becomes frozen; even so does inaction sap the vigor of the mind.

—Leonardo da Vinci

Humans are born with the capacity and inclination to think. Nobody has to “teach us how to think” just as no one teaches us how to move or walk. Moving with precision and style, however, takes much time and coaching. The distinction between awkwardness and grace is obvious to even an undisciplined observer. A superb ballerina, tai chi master, or gymnast needs years of practice, concentration, reflection, and guidance to perform intricate maneuvers on command with seemingly effortless agility.

Like strenuous movement, skillful thinking is hard work. And as with athletics, students need practice, reflection, and coaching to think well. With proper instruction, human thought processes can become more broadly applied, more spontaneously generated, more precisely focused, more complex, and more insightfully divergent.

Unlike athletics, however, thinking is usually idiosyncratic and covert. Awkwardness and agility are not as easily distinguished in thinking as they are in athletics. Definitions of thought processes, strategies

for their development, and assessment of the stamina required for increased mastery, therefore, are elusive, as the following classroom interaction illustrates.

After showing a class of 8th graders how the Earth's population is likely to double in the next 50 years, a teacher asks students what could be done to solve the problem of population explosion.

Student: I don't know.

Teacher: Well, think about it. We may not have enough food and space. It's a problem we will need to solve.

Student: We could send some people somewhere where they won't need food and space.

Teacher: Where?

Student: Uh, into space.

Teacher: Why there?

Student: They won't need to eat our food or live here anymore.
(Swartz, Costa, Kallick, Beyer, & Reagan, 2007, p. 9)

Is this student thinking? Yes. Is this student thinking critically, skillfully, and creatively? It seems not.

Teachers who value thinking and habits of mind would ensure that students confront a problem like population expansion with a questioning attitude, arm themselves with attendant data, explore alternatives to the status quo, and predict the consequences of each of those alternatives. A contrasting teaching approach here might bring out strenuous thinking by taking time as a class to gather more information and understand why the problem exists. A teacher might pose such

questions as, Where in the world has this problem been encountered and resolved in the past? What alternative solutions might be generated? or, By what humane and just criteria might the consequences of each of those solutions be evaluated?

Although thinking is innate and spontaneous, *skillful* thinking must be cultivated. One way to enhance such thinking is to get students intrigued by relevant, generative, conceptual knowledge. Cognition and content are inseparable. One cannot think about “nothing,” and deep conceptual understanding requires such cognitive skills as comparing, analyzing, applying, translating, and evaluating (Wiggins & McTighe, 1998). Further, the deeper knowledge a learner has, the more analytical, experimental, and creative are that learner’s thought processes (Willingham, 2007).

We can catalyze learning to think by making thinking skills explicit. We should use cognitive terminology and label and identify cognitive processes, saying, for example, “So as you’re *analyzing* this problem ... “ (Costa & Marzano, 2001). Teachers should also employ thinking maps and visual tools (Hyerle, 2004) and model problem solving, decision making, and investigating (Swartz et al., 2007).

It is not enough, however, for students to learn thinking and problem-solving skills in teacher-constructed classroom situations. They must also develop the inclination to use productive habits of mind, including persisting, managing impulsivity, thinking flexibly, striving for accuracy, and remaining open to continuous learning—on their own (Costa & Kallick, 2001).

2. Thinking to Learn

Learning is an engagement of the mind that changes the mind.

—Martin Heidegger

Meaning making is not a spectator sport. Knowledge is a constructive process; to really understand something, each learner must create a

model or metaphor derived from that learner's personal world. Humans don't *get* ideas; they *make* ideas.

Content learning, therefore, should not be viewed as the only aim of instruction. Rather, teachers should select relevant, generative, wondrous content to serve as a vehicle for the joyride of learning. We can equip that vehicle by

- Posing challenging, content-embedded questions and problems that tax the imagination and stimulate inquiry.
- Inviting students to assess their own learning.
- Urging students to question their own and others' assumptions.
- Valuing students' viewpoints by maintaining a safe, nonjudgmental classroom atmosphere.

For example, to challenge students to dig deeper into historical perspectives, a teacher might have 5th graders compare and contrast two versions of the story of Pocahontas and John Smith by reading the fictionalized account *The Double Life of Pocahontas* (Fritz, 1987) and watching the Disney movie *Pocahontas*. Students could work in groups to take notes about the characters, setting, plot, and events depicted in the movie and to extract details from the text.

The teacher might direct student groups to draw conclusions about the accuracy of historical events after they identify significant patterns in the similarities and differences of the two sources (Reagan, in press). As each group shares its conclusions, the teacher should reinforce the skill of valuing others' viewpoints by reminding all students to paraphrase, clarify, or question what their peers in other groups report, so that they can better understand each group's conclusions rather than judging them. Following the discussion, students might reflect in their journals about skills to keep in mind when striving for accuracy and searching for truth; the value of listening to and empathizing with a speaker; how well they think they listened and empathized in this activ-

ity; and situations in school, home, and life that require them to strive for accuracy and listen with understanding and empathy.

3. Thinking Together

Friendship is one mind in two bodies.

—Mencius

Meaning making is not just an individual operation. Learning is a reciprocal process; the individual influences the group's thinking, and the group influences the individual's thinking (Marzano, Pickering, & Pollock, 2001; Vygotsky, 1978). Instructional techniques that encourage group activities help students construct both their own and shared knowledge.

When learners fail to see the interconnections and coherence of divergent views, collaborative thinking falters. If each student fixates on his or her own certainties, each perceives the solution to a problem solely from his or her own viewpoint. Such an egocentric view hinders serious reflection and honest inquiry.

Another purpose of a thought-filled curriculum, therefore, is to build an “ecology of thought”—a network of shared memories and awareness that links community members together (Isaacs, 1999). Collegial interaction is a crucial factor in the intellectual ecology of the school and classroom. Collaboratively, individuals can elicit thinking that surpasses individual effort, but such collaboration is difficult because it means temporarily suspending what I, individually, think. It means relaxing our grip on certainties and opening our minds to new perspectives, abiding by and supporting group decisions that are arrived at through deep, respectful listening and dialogue. Learners must come to understand that as they transcend the self and become part of the whole, they will not lose their individuality, only their egocentricity.

Learning to listen with understanding and empathy may be one of the least-taught skills in school, yet it is one of the most powerful skills

of intelligent problem solvers (Steil & Bommelje, 2007). Thought-filled curriculums should include instruction in and practice of

- Focusing mental energy on understanding others.
- Summarizing and paraphrasing others' thoughts.
- Empathizing.
- Monitoring clarity in communication.
- Setting aside judgments, solutions, and autobiographical responses.

4. Thinking About Our Own Thinking

I thank the Lord for the brain he put in my head. Occasionally, I love to just stand to one side and watch how it works.

—Richard Bolles

A broader intent of a thought-filled curriculum is the development of heightened consciousness of our own thinking among both teachers and students. The human species is known as *Homo sapiens sapiens*, which means “a being that knows its knowing.” What distinguishes humans is our capacity for metacognition—the ability to stand back and examine our own thoughts while we engage in them. Although the human brain is capable of generating this reflective consciousness, generally we are not very aware of how we are thinking. Not everyone uses his or her capacity for metacognition equally (Csikszentmihalyi, 1993).

Learning to think begins with recognizing *how* we are thinking—by listening to ourselves and our own reactions and realizing how our thoughts may encapsulate us. Much of the kind of thinking people practice happens simply by virtue of their embedded habits, not because they closely examine their assumptions, their limited history, or their mental models.

Metacognition involves the whole of us: our emotions, bodily sensations, ideas, beliefs, values, character qualities, and the inferences we generate from interactions with others. When confronted

with perplexing, ambiguous situations, skillful thinkers engage in an internal mental dialogue that helps them decide on intelligent actions. We can get students into the habit of such mindful probing by using self-reflective questions like these:

- How can I draw on my past successes to solve this new problem? What do I already know about the problem, and what resources do I have available or need to generate?
- How can I approach this problem flexibly? How might I look at the situation from a fresh perspective? Am I remaining open to new possibilities?
- How can I make this problem clearer, more precise, and more detailed? Do I need to check out my data sources? How might I break this problem down into its component parts and develop a strategy for approaching each step?
- What do I know or not know? What might I be missing, and what questions do I need to ask?
- What strategies are in my mind now? What values, beliefs, and intentions are influencing my approach? What emotions might be blocking or enhancing my progress?
- How is this problem affecting others? How might we solve it together, and what can I learn from others that would help me become a better problem solver?

Teachers can spur metacognition by directing students to verbalize plans and strategies for solving challenging problems—and by urging students to share their thinking as they monitor their progress, evaluate their strategies, and generate alternative strategies.

5. Thinking Big

I learned to make my mind large, as the universe is large, so that there is room for paradoxes.

—Maxine Hong Kingston

Building a thought-filled curriculum serves the larger agenda of building a more thought-filled world—an interdependent learning community where people continually search for ways to care for one another, learn together, and grow toward greater intelligence. We must deepen student thinking to hasten the arrival of a world community that

- Generates more thoughtful, peaceful approaches to solving problems, rather than resorting to violence to resolve differences.
- Values the diversity of other cultures, races, religions, language systems, time perspectives, and political and economic views.
- Shows greater consciousness of how humans affect Earth's limited resources and how we must live in harmony with our delicate environment.
- Engages in clear and respectful dialogue to resolve misunderstandings.

While designing each lesson, thought-filled teachers focus on this larger vision by asking themselves, Are these learnings essential? How do they contribute to building more thoughtful classrooms, schools, and communities, and a more thoughtful world? Teachers encourage students to “think big” when they lead them to inquire into such moral, ethical, and philosophical questions as, What makes human beings human? What is beauty? What is justice? How can we learn to unite and not divide?

These five themes constitute unfinished tasks for teachers and curriculum designers in building a more thought-filled curriculum. As noted computer scientist Alan Kay (1990) stated, “The best way to predict the future is to invent it.” If we want a future that is vastly more thoughtful, cooperative, compassionate, and loving, then we have to create it. The future is in our schools and classrooms today.

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How Mathematics Counts

Lynn Arthur Steen

*Fractions and algebra represent the most subtle, powerful,
and mind-twisting elements of school mathematics.
But how can we teach them so students understand?*

Much to the surprise of those who care about such things, mathematics has become the 600-pound gorilla in U.S. schools. High-stakes testing has forced schools to push aside subjects like history, science, music, and art in a scramble to avoid the embarrassing consequences of not making “adequate yearly progress” in mathematics. Reverberations of the math wars of the 1990s roil parents and teachers as they seek firm footing in today’s turbulent debates about mathematics education.

Much contention occurs near the ends of elementary and secondary education, where students encounter topics that many find difficult and some find incomprehensible. In earlier decades, schools simply left students in the latter category behind. Today, that option is neither politically nor legally acceptable. Two topics—fractions and algebra, especially Algebra II—are particularly troublesome. Many adults, including some teachers, live their entire lives flummoxed by problems requiring any but the simplest of fractions or algebraic formulas. It is easy to see why these topics are especially nettlesome in today’s school environment. They are exemplars of why mathematics counts and why the subject is so controversial.

Confounded by Fractions

What is the approximate value, to the nearest whole number, of the sum $19/20 + 23/25$? Given the choices of 1, 2, 42, or 45 on an international test, more than half of U.S. 8th graders chose 42 or 45. Those responses are akin to decoding and pronouncing the word *elephant* but having no idea what animal the word represents. These students had no idea that $19/20$ is a number close to 1, as is $23/25$.

Neither, it is likely, did their parents. Few adults understand fractions well enough to use them fluently. Because people avoid fractions in their own lives, some question why schools (and now entire states) should insist that all students know, for instance, how to add uncommon combinations like $2/7 + 9/13$ or how to divide $1\frac{3}{4}$ by $2/3$. When, skeptics ask, is the last time any typical adult encountered problems of this sort? Even mathematics teachers have a hard time imagining authentic problems that require these exotic calculations (Ma, 1999).

Moreover, many people cannot properly express in correct English the fractions and proportions that *do* commonly occur, for instance, in ordinary tables of data. A simple example illustrates this difficulty (Schield, 2002). Even though most people know that 20 percent means $1/5$ of something, many cannot figure out what the something is when confronted with an actual example, such as the table in Figure 1. Although calculators can help the innumerate cope with such exotica as $2/7 + 9/13$ and $1\frac{3}{4} \div 2/3$, they are of no help to someone who has trouble reading tables and expressing those relationships in clear English.

These examples illustrate two very different aspects of mathematics that apply throughout the discipline. On the one hand is calculation; on the other, interpretation. The one reasons *with* numbers to produce an answer; the other reasons *about* numbers to produce understanding. Generally, school mathematics focuses on the former, natural and social sciences on the latter. For lots of reasons—psychological,

Figure 1. The Challenge of Expressing Numerical Data in Ordinary Language

Percentage Who Are Runners			
	Nonsmoker	Smoker	Total
Female	50%	20%	40%
Male	25%	10%	20%
Total	37%	15%	30%

Which of the following correctly describes the 20% circled in the table above?

- 20% of runners are female smokers.
- 20% of females are runners who smoke.
- 20% of female smokers are runners.
- 20% of smokers are females who run.

Source: From *Schiold Statistical Literacy Inventory: Reading and Interpreting Tables and Graphs Involving Rates and Percentages*, by M. Schiold, 2002. Minneapolis, MN: Augsburg College, W. M. Keck Statistical Literacy Project. Copyright 2002 by M. Schiold. Available: <http://web.augsburg.edu/~schiold/MiloPapers/StatLitKnowledge2r.pdf>. Reprinted with permission.

pedagogical, logical, motivational—students will learn best when teachers combine these two approaches.

There may be good reasons that so many children and adults have difficulty with fractions. It turns out that even mathematicians cannot agree on a single proper definition. One camp argues that fractions are just names for certain points on the number line (Wu, 2005), whereas others say that it's better to think of them as multiples of basic unit fractions such as $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{5}$ (Tucker, 2006). Textbooks for prospective elementary school teachers exhibit an even broader and more confusing array of approaches (McCrory, 2006).

Instead of beginning with formal definitions, when ordinary people speak of fractions they tend to emphasize contextual meaning. Fractions (like all numbers) are human constructs that arise in particular social and scientific contexts. They represent the magnitude of social problems (for example, the percentage of drug addiction in a given population); the strength of public opinion (for example, the percentage of the population that supports school vouchers); and the consequences of government policies (for example, the unemployment

rate). Every number is the product of human activity and is selected to serve human purposes (Best, 2001, 2007).

Fractions, ratios, proportions, and other numbers convey quantity; words convey meaning. For mathematics to make sense to students as something other than a purely mental exercise, teachers need to focus on the interplay of numbers and words, especially on expressing quantitative relationships in meaningful sentences. For users of mathematics, calculation takes a backseat to meaning. And to make mathematics meaningful, the three *Rs* must be well blended in each student's mind.

Algebra for All?

Conventional wisdom holds that in Thomas Friedman's metaphorically flat world, all students, no matter their talents or proclivities, should leave high school prepared for both college and high-tech work (American Diploma Project, 2004). This implies, for example, that all students should master Algebra II, a course originally designed as an elective for the mathematically inclined. Indeed, more than half of U.S. states now require Algebra II for almost all high school graduates (Zinth, 2006).

Advocates of algebra advance several arguments for this dramatic change in education policy:

- Workforce projections suggest a growing shortage of U.S. citizens having the kinds of technical skills that build on such courses as Algebra II (Committee on Science, Engineering, and Public Policy, 2007).
- Employment and education data show that Algebra II is a "threshold course" for high-paying jobs. In particular, five in six young people in the top quarter of the income distribution have completed Algebra II (Carnevale & Desrochers, 2003).
- Algebra II is a prerequisite for College Algebra, the mathematics course most commonly required for postsecondary

degrees. Virtually all college students who have not taken Algebra II will need to take remedial mathematics.

- Students most likely to opt out of algebra when it is not required are those whose parents are least engaged in their children's education. The result is an education system that magnifies inequities and perpetuates socioeconomic differences from one generation to the next (Haycock, 2007).

Skeptics of Algebra II requirements note that other areas of mathematics, such as data analysis, statistics, and probability, are in equally short supply among high school graduates and are generally more useful for employment and daily life. They point out that the historic association of Algebra II with economic success may say more about common causes (for example, family background and peer support) than about the usefulness of Algebra II skills. And they note that many students who complete Algebra II also wind up taking remedial mathematics in college.

Indeed, difficulties quickly surfaced as soon as schools tried to implement this new agenda for mathematics education. Shortly after standards, courses, and tests were developed to enforce a protocol of "Algebra II for all," it became clear that many schools were unable to achieve this goal. The reasons included, in varying degrees, inadequacies in preparation, funding, motivation, ability, and instructional quality. The result has been a proliferation of "fake" mathematics courses and lowered proficiency standards that enable districts and states to pay lip service to this goal without making the extraordinary investment of resources required to actually accomplish it (Noddings, 2007).

Several strands of evidence question the unarticulated assumption that additional instruction in algebra would necessarily yield increased learning. Although this may be true in some subjects, it is far less clear for subjects such as Algebra II that are beset by student indifference, teacher shortages, and unclear purpose. For many of the reasons given, enrollments in Algebra II have approximately doubled during the last

two decades (National Center for Education Statistics [NCES], 2005a). Yet during that same period, college enrollments in remedial mathematics and mathematics scores on the 12th grade National Assessment of Educational Progress (NAEP) have hardly changed at all (NCES, 2005b; Lutzer, Maxwell, & Rodi, 2007). Something is clearly wrong.

Although we cannot conduct a randomized controlled study of school mathematics, with some students receiving a treatment and others a placebo, we can examine the effects of the current curriculum on those who go through it. Here we find more disturbing evidence:

- One in three students who enter 9th grade fails to graduate with his or her class, leaving the United States with the highest secondary school dropout rate among industrialized nations (Barton, 2005). Moreover, approximately half of all blacks, Hispanics, and American Indians fail to graduate with their class (Swanson, 2004). Although mathematics is not uniquely to blame for this shameful record, it is the academic subject that students most often fail.
- One in three students who enter college must remediate major parts of high school mathematics as a prerequisite to taking such courses as College Algebra or Elementary Statistics (Greene & Winters, 2005).
- In one study of student writing, one in three students at a highly selective college failed to use any quantitative reasoning when writing about subjects in which quantitative evidence should have played a central role (Lutsky, 2006).
- College students in the natural and social sciences consistently have trouble expressing in precise English the meaning of data presented in tables or graphs (Schield, 2006).

One explanation for these discouraging results is that the trajectory of school mathematics moves from the concrete and functional (for example, measuring and counting) in lower grades to the abstract and apparently nonfunctional (for example, factoring and simplifying) in high

school. As many observers have noted ruefully, high school mathematics is the ultimate exercise in deferred gratification. Its payoff comes years later, and then only for the minority who struggle through it.

In the past, schools offered this abstract and ultimately powerful mainstream mathematics curriculum to approximately half their students—those headed for college—and little if anything worthwhile to the other half. The conviction that has emerged in the last two decades that all students should be offered useful and powerful mathematics is long overdue. However, it is not yet clear whether the best option for all is the historic algebra-based mainstream that is animated primarily by the power of increasing abstraction.

Mastering Mathematics

Fractions and algebra may be among the most difficult parts of school mathematics, but they are not the only areas to cause students trouble. Experience shows that many students fail to master important mathematical topics. What's missing from traditional instruction is sufficient emphasis on three important ingredients: communication, connections, and contexts.

Communication

Colleges expect students to communicate effectively with people from different backgrounds and with different expertise and to synthesize skills from multiple areas. Employers seek the same things. They emphasize that formal knowledge is not, by itself, sufficient to deal with today's challenges. Instead of looking primarily for technical skills, today's business leaders talk more about teamwork and adaptability. Interviewers examine candidates' ability to synthesize information, make sound assumptions, capitalize on ambiguity, and explain their reasoning. They seek graduates who can interpret data

as well as calculate with it and who can communicate effectively about quantitative topics (Taylor, 2007).

To meet these demands of college and work, K–12 students need extensive practice expressing verbally the quantitative meanings of both problems and solutions. They need to be able to write fluently in complete sentences and coherent paragraphs; to explain the meaning of data, tables, graphs, and formulas; and to express the relationships among these different representations. For example, science students could use data on global warming to write a letter to the editor about carbon taxes; civics students could use data from a recent election to write op-ed columns advocating for or against an alternative voting system; economics students could examine tables of data concerning the national debt and write letters to their representatives about limiting the debt being transferred to the next generation.

We used to believe that if mathematics teachers taught students how to calculate and English teachers taught students how to write, then students would naturally blend these skills to write clearly about quantitative ideas. Data and years of frustrating experience show just how naïve this belief is. If we want students to be able to communicate mathematically, we need to ensure that they both practice this skill in mathematics class and regularly use quantitative arguments in subjects where writing is taught and critiqued.

Connections

One reason that students think mathematics is useless is that the only people they see who use it are mathematics teachers. Unless teachers of all subjects—both academic and vocational—use mathematics regularly and significantly in their courses, students will treat mathematics teachers' exhortations about its usefulness as self-serving rhetoric.

To make mathematics count in the eyes of students, schools need to make mathematics pervasive, as writing now is. This can best be

done by cross-disciplinary planning built on a commitment from teachers and administrators to make the goal of numeracy as important as literacy. Virtually every subject taught in school is amenable to some use of quantitative or logical arguments that tie evidence to conclusions. Measurement and calculation are part of all vocational subjects; tables, data, and graphs abound in the social and natural sciences; business requires financial mathematics; equations are common in economics and chemistry; logical inference is fundamental to history and civics. If each content-area teacher identifies just a few units where quantitative thinking can enhance understanding, students will get the message.

The example of many otherwise well-prepared college students refraining from using even simple quantitative reasoning to buttress their arguments shows that students in high school need much more practice using the mathematical resources introduced in the elementary and middle grades. Much of this practice should take place across the curriculum. Mathematics is too important to leave to mathematics teachers alone.

Contexts

One of the common criticisms of school mathematics is that it focuses too narrowly on procedures (algorithms) at the expense of understanding. This is a special problem in relation to fractions and algebra because both represent a level of abstraction that is significantly higher than simple integer arithmetic. Without reliable contexts to anchor meaning, many students see only a meaningless cloud of abstract symbols.

As the level of abstraction increases, algorithms proliferate and their links to meaning fade. Why do you invert and multiply? Why is $(a + b)^2 \neq a^2 + b^2$? The reasons are obvious if you understand what the symbols mean, but they are mysterious if you do not. Understandably, this apparent disjuncture of procedures from meaning leaves many students thoroughly confused. The recent increase in standardized

testing has aggravated this problem because even those teachers who want to avoid this trap find that they cannot. So long as procedures predominate on high-stakes tests, procedures will preoccupy both teachers and students.

There is, however, an alternative to meaningless abstraction. Most applications of mathematical reasoning in daily life and typical jobs involve sophisticated thinking with elementary skills (for example, arithmetic, percentages, ratios), whereas the mainstream of mathematics in high school (algebra, geometry, trigonometry) introduces students to increasingly abstract concepts that are then illustrated with oversimplified template exercises (for example, trains meeting in the night). By enriching this diet of simple abstract problems with sophisticated realistic problems that require only simple skills, teachers can help students see that mathematics is really helpful for understanding things they care about (Steen, 2001). Global warming, college tuition, and gas prices are examples of data-rich topics that interest students but that can also challenge them with surprising complications. Such a focus can also help combat student boredom, a primary cause of dropping out of school (Bridgeland, DiIulio, & Morison, 2006).

Most important, the pedagogical activity of connecting meaning to numbers needs to take place in authentic contexts, such as in history, geography, economics, or biology—wherever things are counted, measured, inferred, or analyzed. Contexts in which mathematical reasoning is used are best introduced in natural situations across the curriculum. Otherwise, despite mathematics teachers' best efforts, students will see mathematics as something that is useful only in mathematics class. The best way to make mathematics count in the eyes of students is for them to see their teachers using it widely in many different contexts.

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Why Aren't More Minorities Taking Advanced Math?

Erica N. Walker

*By examining our assumptions and widening curriculum choices,
we can bring more minorities into upper-level math.*

Two decades ago, Lee Stiff and William Harvey (1988) noted that the mathematics classroom is one of the most segregated places in the United States. Despite some improvement, upper-level mathematics classes are still populated with relatively few black and Latino students. Why aren't more students from these minority groups taking high-level mathematics courses?

Contrary to persistent myth, it's not that they lack interest in math or don't have high educational aspirations. In fact, several studies document that black and Latino students sometimes have more positive attitudes toward mathematics and higher educational aspirations than do their white counterparts, especially in the early years of secondary school (Goldsmith, 2004; Strutchens & Silver, 2000). Yet students from these minority groups are less likely than Asian American and white students to complete advanced high school mathematics classes (National Center for Education Statistics, 2004; Teitelbaum, 2003), classes that are crucial prerequisites for admission to competitive colleges and for career success. Although schools have achieved greater parity for some college-preparatory courses—algebra and geometry, for example—there are still ethnicity-related gaps in enrollments in courses like trigonometry and calculus. These gaps have profound implications for

students' achievement (Teitelbaum, 2003). One study found that, after controlling for demographic factors, one-third of the achievement gap in mathematics was due to course-taking differences (Secada, 1992).

Despite the curricular reforms of the 1980s, the “algebra for all” movements of the 1990s, and the advent of No Child Left Behind in the 2000s, there is still great variability in opportunities to learn higher mathematics in schools across the United States. Students attending predominantly minority schools still receive fewer opportunities to learn rigorous mathematics (Darling-Hammond, 2004; Tate, 1997).

Instead of sometimes impeding student progress, how can teachers and schools support students of color in high-level mathematics? I present here six suggestions—three that focus on necessary shifts in educators' attitudes and three that focus on curricular shifts—that can help foster improved math achievement for underrepresented students.

Expand Our Thinking About Who Can Do Mathematics

Too often, ethnic minority students' opportunities are limited because of others' perceptions of their ability to do mathematics. School and teacher practices that hold minority students back from doing advanced mathematics abound (Walker, 2003). Some schools offer limited numbers of high-level mathematics courses, thus restricting the number of students who can enroll. Teachers may not recommend students for advanced classes for inappropriate reasons. For example, in a school at which students' grades were evaluated at the end of each quarter to determine which students should be moved into higher math courses, a black student who excelled in her general-level algebra course was not moved up. Her teacher justified this decision by saying she needed this student to remain in the general-level course because she was a good role model for other students in this predominantly black and Latino class.

Teachers' perceptions of their students and what those students are capable of affect the type of curriculum, instruction, and assessment teachers offer. School leaders' perceptions of what is "realistic" or "necessary" for certain students affect whether a school offers advanced mathematics courses, what textbooks the school chooses, where students are placed, and how principals assign teachers.

The increasing resegregation of U.S. schools (Orfield, Frankenberg, & Lee, 2002–2003) may also be linked to fewer opportunities for black and Latino students to do high-level mathematics. When students from these minority groups attend predominantly white schools, tracking practices may lead them to be segregated in low-level courses (Oakes, 1995). When they attend predominantly minority schools, there may be fewer advanced course offerings available within the school as a whole, and their teachers may present lower-level math curriculum, even in advanced classes (Darling-Hammond, 2004).

Build on Minority Students' Existing Academic Communities

Teachers and school administrators must think beyond pervasive assumptions that peer-group influences among underrepresented students are largely negative. Instead of assuming that ethnic minority students' peers and communities do not support their mathematical achievement, teachers should tap into the supportive networks that many minority students actually possess (Walker, 2006).

In a recent study, I interviewed 21 black, Latino, and Latina high math achievers at Lowell High School in New York City, which is a majority-minority, high-poverty school. I asked them, among other questions, Who or what contributes to your success in math? Their answers and anecdotes revealed that they had extensive networks of teachers, peers, parents, and siblings who supported their math achievement.

These networks, like those historically present in many minority communities, emphasized the importance of education. In many cases,

students were supported by adults who had not done well in school themselves or had even dropped out but encouraged the students to study math. Although in some cases these adults did not explicitly help the students with mathematics, they urged them to do their homework and take advantage of opportunities. As a Latina student named Ana said, “My mom, she never went to school, but she loves math. She’s like, you should do well, and math helps you.”

Individuals in these students’ academic communities discussed mathematics with them, tutored them, and urged them to persist. Several students, in turn, informally tutored friends and family members. One student noted:

Me and my friend Andrew. . .we talk about math every day after class. Like when we have a test we talk about who got the higher grade, or “Why did you get that part wrong?” (Walker, 2006, p. 60)

Learn from Schools That Promote Math Excellence

The dominant discourse about under-represented students and mathematics achievement focuses largely on deficiencies and overlooks evidence of academic excellence within these populations—as well as evidence from schools that promote high achievement among these students (for an exception, see Martin, 2000). Studies of such schools and classrooms (such as Gutierrez, 2000; Ladson-Billings, 1997) note that they are characterized by meaningful relationships between teachers and students, high expectations by teachers, and rigorous curriculums.

To create more sites of math excellence for underserved students, we should look to the success stories. Too often, schools serving large populations of minority students emphasize “slowing down” or providing less mathematics content, rather than providing more

challenging content. Yet post-secondary institutions that foster success in mathematics among underserved students do not appear to steer their students toward lower-level math streams, but toward professions demanding high-level math. For example, in 2000, historically black colleges and universities served 25 percent of black students who graduated with a bachelor's degree, yet they graduated 40 percent or more of all black students who received bachelor's degrees in physics, chemistry, astronomy, environmental sciences, math, and biology. In 2004, such colleges made up 12 of the top 15 schools graduating high numbers of black students with bachelor's degrees in mathematics (Southern Education Foundation, 2005).

According to a 2005 study commissioned by the Southern Education Foundation, historically black institutions use these key elements to prepare students for careers in science, technology, engineering, and mathematics:

- Intense, personal introductory programs for new students.
- High levels of counseling, mentoring, and guidance.
- Rigorous interactive instruction.
- Adequate financial aid.
- Meaningful research experiences and internships.
- Hospitable, caring campus climates.

Several mathematics- and science-focused programs at predominantly white institutions (such as the Meyerhoff Scholars Program at the University of Maryland, Baltimore County) support the development of underserved students as mathematicians. These programs also focus on students' talents rather than supposed deficiencies. They offer a supportive group culture for mathematics, rigorous coursework, and enrichment opportunities, similar to the practices of the historically black schools.

Expand the Options in School Mathematics Courses

The unvarying nature of school mathematics in the United States—the repetition of elementary coursework and the rigid hierarchy of secondary mathematics courses—dampens interest in mathematics for many students, not just minorities. Math enjoyment decreases with the years: In 1996, 69 percent of U.S. 4th graders reported liking mathematics, whereas only 50 percent of 12th graders did so (Strutchens & Silver, 2000).

We should ensure that elementary students get the foundational skills they need while also exposing them to interesting mathematics problems linked to life experiences—problems that tap creativity, critical thinking, and problem solving. In high school, the traditional college-preparatory course sequence (Algebra I–Geometry–Algebra II–Trigonometry–Precalculus–Calculus) could also include statistics, number theory, the history of mathematics, or other rigorous topics. Such topics—and exploration of how mathematics relates to other disciplines—expand students’ understanding of what mathematics is and pique their interest in pursuing it.

Many schools have experimented with block scheduling, integrated mathematics courses, courses using computer-assisted instruction, and other options. Increasing course options in summer and during the academic year clearly benefits black and Latino students. For example, Jaime Escalante’s work shows that when formerly underserved students are given the opportunity to take additional math courses in summer, they can excel in AP Calculus (Escalante & Dirmann, 1990). There is no reason why students can’t, for example, take Geometry and Algebra II simultaneously in preparation for more advanced coursework.

Even if high school students have problems with basic math skills, that is not an excuse for exclusively offering a low-level, rote curriculum that neither challenges students nor builds problem-solving

and critical-thinking skills. Before school administrators assume that students aren't interested in advanced course options, they should inquire. In one study I conducted, underserved high school students lobbied for an AP Calculus course, much to the principal's surprise.

Expand Enrichment Opportunities

Many people in the United States often believe that only a few individuals can do advanced mathematics. This reflects the lack of opportunity many of us had as children to do mathematics activities outside classrooms. Young people should experience mathematics in more out-of-classroom situations. Schools can form math quiz teams, certainly, but they can also create engineering, gaming technology, or graphic arts clubs. Teachers should promote family involvement in mathematics activities, just as they promote family reading in children's early years.

We should build on existing student competence in mathematics by forming peer-tutoring collaboratives, which would have the added benefit of exposing teachers to the expertise of students (thus challenging the myth that teachers are the sole arbiters of mathematics knowledge) and solidifying the knowledge of student tutors.

Reduce Students' Isolation

Several researchers (for example, Boaler, 2002) have explored "mathematics identity" and how school and classroom dynamics affect students' math engagement. Minority students may feel isolated in advanced math classes in predominantly white settings, and this isolation can have a negative effect on their persistence and retention (Walker & McCoy, 1997). Because 35 to 40 percent of black and Latino students attend predominantly white schools (Goldsmith, 2004), schools should organize classes so that a critical mass of underserved students can take advanced math courses together. We must ensure that black

and Latino students develop a diverse peer network that supports their mathematics achievement.

The fact that mathematics is a social enterprise should not be taken lightly. Teaching and learning math is not necessarily a color-blind enterprise. Students in one study (Walker & McCoy, 1997) expressed reluctance to ask questions or speak up in front of white peers for fear of badly “representing the race”:

If you're in math class and the teacher calls on you, and you're like the only black person in there, you don't want to say something wrong 'cause she might think you representing your whole race when you say it. . . . That's what I hate about being about two or three blacks in our class, because you say something, they'll look at you like “where'd she get that from?” (Walker, 1997)

Some studies suggest that minority students avoid taking advanced mathematics courses in school because they want to take classes with their friends (Walker & McCoy, 1997). Allegiance to peers, particularly in a predominantly white setting, may trump students' academic interests.

Providing students the opportunity to study mathematics in diverse groups, demonstrate their expertise in nonthreatening settings, solve problems collaboratively, and ask questions in class without the burden of being “the only one” may sound like indulging personal issues that have nothing to do with math. But negative school and classroom experiences have powerful effects on students' achievements and aspirations (Goldsmith, 2004). Paying attention to the affective aspects of learning is important. Goldsmith's analysis of data from the 1988 National Education Longitudinal Study found that black and Latino youth studying in predominantly minority schools with predominantly minority teachers had the highest career expectations and educational aspirations of all black and Latino students polled. Minority students attending predominantly minority schools with a mostly white teaching

staff had the next highest aspirations, followed by minority students in predominantly white schools. Further, on both reading and math tests, Goldsmith found that black and Latino students with a strong belief in their own potential achieved higher than did such students with low expectations.

These suggestions do not mitigate the need to provide increased resources to schools serving large numbers of underserved students. But they provide direction for what we can do now. We are overlooking innumerable chances to develop excellence in math achievement among black and Latino students. We know that building on students' positive perceptions of mathematics while providing rich opportunities to do mathematics in and out of school can increase the numbers of minority students demonstrating such excellence. Let us commit to doing so on a large scale.

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What's Been Lost in the Bubbles

Linda Nathan

*Massachusetts schools don't need another standardized test.
They need a broader definition of excellence.*

In Massachusetts, we are celebrating the 15th anniversary of the passage of the state's 1993 Education Reform Act (commonly known as Ed Reform). Those who promoted this legislation promised it would narrow the achievement gap while raising standards. A cornerstone of this law is the Massachusetts Comprehensive Assessment System (MCAS), a statewide testing program that measures students' performance on learning objectives defined by the state's curriculum framework.

As a public school educator who has seen the changes wrought by Ed Reform, I'm not sure what we're celebrating. The stated intention of this testing program was to radically rethink how we measure and communicate student progress on learning objectives, and the law's champions indicated that schools could use multiple measures to demonstrate students' proficiency. Yet MCAS does not include multiple ways to demonstrate competencies; it is a fill-in-the-bubble test. Stakes are high, as schools' scores are printed in the newspaper and schools are required to demonstrate adequate yearly progress. Portfolios, exhibitions, and other alternative assessments have taken a back seat in most schools.

In addition, black and Latino students in Boston are now more than twice as likely as white and Asian youth to drop out of high school, according to data from the Boston Youth Transition Task Force (2006).

High-stakes exams have the greatest negative effect on low-income students, minority students, and low achievers. Beginning with the class of 2003, all Massachusetts students must pass the MCAS to graduate: Student interviews suggest that this pressure may drive students away from school (Capodilupo & Wheelock, 2000). As students leave school at younger ages, average scores on the MCAS and graduation rates may increase, but young people are lost to our education system.

Ed Reform also came with a pledge to increase funding to urban schools. In actuality, the state did provide additional funding to urban schools like the one I lead, but as test scores improved, these extra funds were taken away.

Since 1998, when I helped found the Boston Arts Academy, five years after the state enacted MCAS, our curriculum has become narrower and less engaging, even though we're a public school focused on the arts. Our school has had to sacrifice breadth in science teaching. We spent seven years developing a rigorous, engaging curriculum that combined physical and biological sciences and increased in complexity each year. As a result of MCAS testing, we returned to a "layer-cake approach"—teaching first physical science (which we incorporate into an engineering course), then chemistry, then biology, all to ensure that students pass the state tests (Nathan, 2002b).

Meanwhile, the issues surrounding the passage of Ed Reform, such as the dropout rate and students' lack of basic skills, are as much a problem now as they were when the legislation passed.

What do these realities mean for school leaders who feel hamstrung by MCAS requirements? I think they mean that we need to hold in our minds what true excellence in learning looks like and struggle to maintain it. And we need to keep putting out the message that excellence must be defined more broadly than getting all the bubbles filled in correctly. The following example describes the kind of rich instructional practice that we may have to abandon this instructional year when MCAS will add history to the high school subjects tested.

A Case Study of Excellence

As part of our Humanities 3 class for juniors, our students participate in in-depth peer-critique sessions. In their study of global and U.S. history and literature from 1945 to the present, they explore political and social conditions characteristic of the world, such as how arms races develop and how global alliances form and shift. We urge them to seek explanations for these conditions to facilitate their own participation in—and pursuit of—democracy.

We also help Humanities 3 students gain excellent writing skills by asking them to help one another deepen their thinking and communicate that thinking more precisely. As part of a major writing assignment, each student receives a first (anonymous) draft of two other students' papers and prepares a critique designed to improve those drafts. On a given day, students who have exchanged papers come together; each student orally shares his or her critique, and each writer has a chance to respond.

At the beginning of one such critique session, Adrienne, Tony, and Veronica sit at a table. They shuffle nervously through the papers before them until Mr. Garcia, their teacher, says,

We'll begin with Adrienne asking Tony about his draft. Remember, today is about your skills as a critical reader. You will all have an opportunity to rewrite your papers using this feedback and some from me as well. Today is not about being defensive, but about soaking up criticism and getting better.

Adrienne picks up her notes and begins,

It's hard to identify your thesis. I know your topic is the Black Panthers and their role in the civil rights movement, but I think it would have helped if you'd have read this draft aloud to make it clear. Are you trying to say that the Black Panthers are different from other groups?

Tony is listening quietly and taking notes. Adrienne continues,

I'd like you to clarify why you say, "Blacks today should be grateful." You didn't really explain what people felt back then, so it's confusing to suddenly talk about today. It would have helped to explain what people in the black community felt toward the Black Panthers. And you seemed to assume that I knew about Huey Newton, Malcolm X, and Bobby Seale. Some brief biographical information would be helpful. This is my final question—a challenging one. What was your main idea? I couldn't really tell.

Adrienne looks up expectantly, and Tony responds,

You're right that I need to do a lot more on this draft. Actually, my thesis isn't about whether the Panthers were different from other groups, but about how violent and nonviolent protests have affected today's black society. In my next revision, I will explain about how we live in the shadows of the legacies of yesterday and include more historical background.

Next, Tony gives feedback on Adrienne's paper on school desegregation and busing in Boston in the 1970s. Although he could be smarting from her critique of his draft, he shares thoughtful comments, including a push for more specifics:

You explain the pros and cons [of busing] very well, but I would have liked more information about how various families from different racial and ethnic groups reacted to busing. You hint at this, but you are not specific. And you refer to the educational imbalance in the schools before busing, but you need to give some specific examples and . . . explain how this affects society today. But . . . you made me really think about how Boston would have been different without busing for all of us.

The discussion moves to Veronica's critique of Adrienne's paper. Veronica shares general comments about the strengths and weaknesses of

Adrienne's arguments, asks clarifying questions, and notes how Adrienne's conclusion made her think in a more nuanced way about what her own paper—also on busing in Boston—might lack:

I've grown up hearing from my parents about how bad busing was. . . . You raised a lot of the positive points about busing that I'd never even thought about. I guess I'd always assumed it was as bad for black people as for white people like me . . . I'm thinking I need to do some additional research for my own paper.

Each of the students has one more opportunity to ask an author in the group questions about that author's draft and to respond to a critique of his or her own draft.

What MCAS Would Measure

In this assignment, students learn from one another and take risks. For example, as a white teenager in a school with a minority of white students, Veronica might have feared that her perspective on a controversial issue like busing would not be accepted. However, the assignment guides students to critique one another's positions for evidence and clarity—not in terms of whether their views agree. This pushes students toward the overarching goal of presenting a persuasive argument with clarity and evidence.

This complex process of students examining their own—and one another's—thinking about social issues is a far cry from the narrow learning of discrete facts that poses as education reform in Massachusetts today. The state rolled out its history test this fall, and freshmen at Boston Arts Academy will need to pass this test at the end of the 2008–09 school year. Far from reflecting the goals of excellent learning, it requires random recognition of historical facts. Here's a sample question:

Which of the following issues was central to the Nullification Crisis of 1832–1833? (A) due process (B) laissez faire (C) states' rights (D) women's rights. (Massachusetts Comprehensive Assessment System, 2007).

This test reflects what I call a “laundry list approach to learning a myriad of isolated facts” (Nathan, 2000). If Massachusetts persists in this approach, the humanities curriculum we have developed and taught for 10 years at Boston Arts Academy—which combines study in history, English, social studies, civics, and economics (Nathan, 2004) and which benefits students like Adrienne, Tony, and Veronica—may be sacrificed.

Reexamining Our Goals

Other schools' losses are even more dramatic. Fifteen years into Ed Reform, a typical public high school in Boston offers virtually no visual arts, music, dance, or theater. The sole goal is to pass the MCAS.

Passing the MCAS is not a terrible goal. We all want our students to possess basic literacy and numeracy skills. But we must understand the price we pay as a society when schools become little more than places for students to pass a test. A steady diet of test prep will not help our graduates achieve our higher goals, such as interacting with and influencing our complex world. Instead, we will foster another generation of disengaged, poorly educated students.

The state has a right to ascertain that our graduates have basic mathematical and reading competencies and can write a cogent and convincing essay. But standardized testing of students' competencies should stop there.

What I Propose

I don't want Boston Arts Academy to be forced to eliminate our humanities curriculum as we were forced to scotch our integrated science

curriculum. And I don't want other schools in the state to be hampered in promoting excellence.

So what would represent true education reform? A truly reformed curriculum would help students gain the desperately needed ability to

- Pose and solve problems not just quantitatively, but also qualitatively and creatively. Reform must embrace the concept that artistic expression, imagination, and creativity are skills our students should practice if they are to solve problems better than society has done in the past.
- Understand and act effectively within political and economic realities. For example, students should understand the stock market, the legislative process, and the workings (or nonworkings) of the electoral system.
- Know how to play a musical instrument, and savor experiences with live theater and dance, both on stage and in the audience.
- Be competent in different artistic media and understand the value of museums.
- Interact within different languages and cultures—and realize that the global economy and national security depend on people's ability to move through the world respectfully and conscientiously.

An overarching goal of reform should be to create graduates who demonstrate “community with social responsibility” (one of our school's four main values). Students need positive experiences tackling community problems. If we hope for young people to care about improving the world, we must give them the opportunity to try out this kind of work in school.

I want this bold approach to teaching and learning to be the cornerstone of a *new* education reform agenda. Massachusetts should make the

following changes in its program of curriculum requirements, standards, and assessments for high schools:

- Cancel the upcoming standardized history test as a requirement. The state should allow schools, in conjunction with districts, to develop and present alternative methods for assessing competencies in history and other areas, including science, the arts, foreign language, and physical education.
- Require four years of the arts for all public high school students.
- Reopen dialogue between educators and parents throughout Massachusetts to suggest different ways to assess student learning.

If we do not promote such reform in Massachusetts, the kind of deep learning that humanities students experience at Boston Arts Academy will be replaced with prep for another standardized test. To teach our students to think, evaluate, write, revise, articulate a position with evidence, and create new ways of approaching old problems requires true reform—not a test. We need renewed conversation about the kind of pedagogy needed to teach such skills, particularly in urban centers.

Excellence in schools costs money and time. It requires training teachers to do the complex work that committed educators do. If we believe our students are the future, we must redirect resources to ensuring that future.

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Author's note: For further discussion of alternatives to MCAS, see Nathan, 2002a.

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Part 3

Developing
Student Thinking

Disciplining the Mind

Veronica Boix Mansilla and Howard Gardner

Students need more than a large information base to understand their ever-changing world. They need to master disciplinary thinking.

The unit on industrialization was almost over. Phillip, a 10th grade world history teacher, began to design the final test. In the past, he had included questions from his weekly quizzes as well as new questions about key events, people, and inventions. This approach had proven comfortable for both him and his students.

But this time he decided to raise the stakes. He wondered whether students' understanding of the process and meaning of industrialization had improved over the last six weeks. Could students explain *why* industrialization took place? Could they recognize how difficult it is for historians to build an empirically grounded portrait of an unfolding past or draw telling comparisons with today's communications revolution? These goals seemed far more important than the usual litany of names, dates, and locations. Yet Phillip worried that his students would see reflective questions of this kind in the final exam as foul play.

Phillip's dilemma permeates classrooms around the world and across the disciplines. It addresses issues of accountability, the nature of teacher-student interactions, and the rituals of schooling. Most striking, it reveals two colliding views of what it means to understand history, biology, mathematics, or the visual arts. From the conventional standpoint, students learn *subject matter*. In general, they and their teachers conceive of the educational task as committing to memory

large numbers of facts, formulas, and figures. Fixed in textbooks, such facts are taken as uncontroversial, their mastery valued as a sign of cultural literacy.

In sharp contrast with teaching subject matter, an alternative perspective emphasizes teaching *disciplines* and *disciplinary thinking*. The goal of this approach is to instill in the young the disposition to interpret the world in the distinctive ways that characterize the thinking of experienced disciplinarians—historians, scientists, mathematicians, and artists. This view entrusts education institutions with the responsibility of disciplining the young mind (Gardner, 1999, 2006; Gardner & Boix Mansilla, 1994).

In our view, Phillip's transition from teaching subject matter to nurturing the disciplined mind is emblematic of a fundamental shift in the way in which educators, policymakers, and the general public conceive of curriculum, instruction, and assessment. Indeed, preparing students to understand the world in which they live today and to brace themselves for the future entails a necessary transformation.

Teaching Subject Matter

Most students in most schools today study subject matter. In science, students memorize animal taxonomies, atomic weights, and the organs in the respiratory system. In mathematics, they learn algebraic equations and geometrical proofs by heart so they can plug in the appropriate numbers. In history, they are expected to remember key actors, events, and periods. In the arts, they classify works by artist and school.

Subject-matter learning involves mentally recording such propositions as, "The first Industrial Revolution took place in Britain at the end of the 18th century," "The chemical composition of water is H^2O ," and "Picasso's *Les Demoiselles d'Avignon* is a cubist painting painted in 1907." From a subject-matter perspective, students come to see the subjects of history and science as the collection of dates, actors, facts,

and formulas catalogued in textbooks and encountered in rooms 458 and 503, in second and third period.

The Power of Ingrained Ideas

Clearly, there is much to admire in an individual who knows a great deal of information. Further, there is an appealing sense of efficiency in subject-matter teaching: Teachers can rapidly present large quantities of information to students and easily test this information. The apparent benefits pale, however, when we consider how the young human mind develops and how best to prepare that mind for the future.

In recent decades, cognitive psychologists have documented a phenomenon of vital importance for anyone interested in education. Although students have little trouble spewing forth information that they have committed to memory, they display great difficulty in applying knowledge and skills to new situations. Youngsters who have studied the solar system are unable to apply what they have learned to explain why it is warm in the summer in the northern hemisphere. When asked to explain how a particular species trait or behavior has emerged, students studying biological evolution revert to pre-Darwinian “intentional” or teleological explanations. Students who are able to define cubism as a successful challenge to 19th-century aesthetic sensibilities naively equate a classical definition of “beautiful” with “good” when visiting a museum. Centuries of accumulated forms of expertise have simply bypassed these young minds despite a decade or more of formal education. Why is this so?

According to cognitive psychologists, early in life children develop powerful intuitive ideas about physical and biological entities, the operations of the human mind, and the properties of an effective narrative or graphic display. Some of these ideas are powerful precursors of sophisticated disciplinary understanding. For example, by age 5, children understand that narratives have beginnings, turning points, and endings and that the succession of events must “make sense” for

the story to work. Historians, too, organize their accounts of the past in the form of narratives—intelligible accounts marked by turning points and preferred actors’ perspectives.

Unfortunately, not all children’s ideas are equally auspicious. Unlike historians, young students prefer simple explanations and clear distinctions between “good” and “mean” actors. They believe that events always result from intentional actions—especially the actions of leaders; they have difficulty understanding unintended consequences. Moreover, students often project contemporary knowledge and values onto the minds of actors in the past, making “presentism” one of the most difficult misconceptions to eradicate.

The Limitations of Subject-Matter Learning

Regrettably, subject-matter learning does not challenge such robust intuitive theories. Indeed, memorization does not even acknowledge the existence of these entrenched ways of making sense of the world. As a result, in subject-matter classrooms, students tend to momentarily retain the information presented, or they reorganize it in oversimplified linear plots. For example, students may record that the steam engine triggered the Industrial Revolution, then farmers rushed to the cities in search of work, then leading businessmen amassed enormous wealth and soon became abusive robber barons. In response, government and labor organized to regulate working conditions.

The plot demonstrates its fragility when students encounter apparent contradictions. Consider, for example, what happens when students learn that organized efforts to defend the rights of working people *preceded* the popularization of the steam engine. Students who have memorized a plotline—first industrialization, then unrest, then labor unions—cannot assimilate this information. More challenging still, the predisciplinary mind fails to appreciate that aspects of the Industrial Revolution are being recapitulated in the current digital upheavals around the globe.

Subject-matter learning may temporarily increase students' information base, but it leaves them unprepared to shed light on issues that are even slightly novel. A different kind of instruction is in order, one that seeks to discipline the mind.

The Disciplined Mind

For a historian, a statement such as, "The first Industrial Revolution took place in Britain at the end of the 18th century," is not a fact to remember but rather a contestable claim that stems from deliberate ways to partition the past. It is constructed through close analysis of sources that capture the lives of Britons over centuries of progressive urbanization.

For students, learning to think historically entails understanding that historical accounts are sometimes conflicting and always provisional. Students learn that interpretations of the past are not simply a matter of opinion, nor must one account be "right" and the other "wrong" when differences occur. Rather, the disciplined mind weighs competing accounts through multiple considerations. For instance, a history of the nascent industrial working class will contrast with a history focusing on the captains of industry. Long-term accounts may capture slow population changes, whereas pointed accounts shed better light on the role of individuals and inventions. A disciplinary approach considers the types of sources consulted, such as letters, newsletters, and accounting and demographic records. It also assesses whether conflicting accounts could be integrated into a more comprehensive explanation.

All disciplines embody distinct ways of thinking about the world. Scientists hold theories about the natural world that guide their observations. They make hypotheses, design experiments to test them, revise their views in light of their findings, and make fresh observations. Artists, on the other hand, seek to shed novel light on the object of their attention, depict it with masterful technique, and stretch and provoke

themselves and their audiences through deliberate ambiguities in their work.

Of course, it is unreasonable to expect all students to become expert scientists, historians, and artists. Nevertheless, quality precollegiate education should ensure that students become deeply acquainted with a discipline's fundamental perspectives on the world by developing four key capacities (Boix Mansilla & Gardner, 1999).

Capacity 1: Understanding the Purpose of Disciplinary Expertise

Disciplines inform the contexts in which students live. Supply-and-demand principles determine the products that line the shelves of supermarkets; biological interdependence shapes the life of animals and plants at the local park as well as in the rain forest.

Students of history grasp that the purpose of their discipline is to understand past human experience—not to make predictions but to meet the present and the future in informed ways. For example, understanding how novel forms of work accelerated the formation of class consciousness among 18th-century industrial workers prepares students to appreciate the experience of contemporary workers in China, India, or Malaysia. Although students learn to attend to important differences between past and present conditions—contemporary digital calling centers in India bear little resemblance to the early textile factories in Leeds, England—they also understand that rapid urbanization forces these workers, like their predecessors, to juggle economic opportunities with anxiety over challenges to family life and cultural tradition.

Capacity 2: Understanding an Essential Knowledge Base

An essential knowledge base embodies concepts and relations central to the discipline and applicable in multiple contexts. It also equips students with a conceptual blueprint for approaching comparable novel situations. For instance, in a unit on industrialization,

students may examine the dynamic interaction between technology and society to decide whether they deem industrialization to be “progress” or “decline.” Students can apply this blueprint to technological developments at different points in time, from the printing press, to the sewing machine, to today’s Internet.

Capacity 3: Understanding Inquiry Methods

In contrast to naïve beliefs or mere information, disciplinary knowledge emerges from a careful process of inquiry and vetting claims. The disciplined mind considers forms of evidence, criteria for validation, and techniques that deliver trustworthy knowledge about the past, nature, society, or works of art.

In our own research, we have found that high school students trained in history recognize the demands of source interpretation, complex causal explanation, and the provisional nature of historical accounts (Boix Mansilla, 2005). However, becoming a better historian does not make students better scientists, artists, or mathematicians—or vice versa. For example, when asked to adjudicate between competing accounts in science—a domain in which they have not been rigorously trained—the same students exhibit a subject-matter approach to inquiry. They view science as a domain in which one simply observes the world and writes down one’s conclusions. Conversely, award-winning students in science tend to perceive history as all about dates and facts that one need only “find in sources” and “put together in a story.” Cross-disciplinary transfer proves elusive.

Capacity 4: Understanding Forms of Communication

Disciplines communicate their expertise in preferred forms and genres. Historians see narratives as the best fit for their work, whereas scientists opt for data-heavy research reports. The disciplined mind understands these favored genres because it can place them in the broader context of their disciplinary origins. For example, the

disciplined scientific mind understands that, unlike Darwin's *On the Origin of Species*, a biblical account of human creation cannot stand the test of empirical evidence, nor can it aspire to consideration as a scientific claim.

Students develop a disciplined mind when they learn to communicate with the symbol systems and genres of a discipline. In science, students learn how to write (and recognize) a well-crafted scientific report in which clear and testable hypotheses, methodology, results, and discussion are made public for readers to weigh. In history, knowledge about the past is embodied in vivid and well-footnoted narratives as well as in museum exhibits, monuments, and documentary films.

How to Nurture the Disciplined Mind

Teachers can help students develop disciplinary competencies in several ways (Gardner, 2006):

- *Identify essential topics in the discipline.* In our example about industrialization, some topics will address the knowledge base, such as the transformation of production systems and social organization during the Industrial Revolution. Some will address the methods of the discipline, such as understanding conflicting accounts of workers' experiences and worldviews during the early stages of the Industrial Revolution. Some will address the purposes of the discipline, such as understanding how changes in technology lead to changes in ways of thinking both then and now. Some topics will address the forms of communication in the discipline, such as understanding what makes a historical narrative masterful.
- *Spend considerable time on these few topics, studying them deeply.* By encouraging students to examine multiple perspectives on a topic and study them in depth, teachers help students become young experts in different topic areas.

- *Approach the topic in a number of ways.* Students may readily approach the social transformations associated with the Industrial Revolution by reading biographies and life stories. Other students may learn through careful analysis of demographic data or interpretation of artworks of the times. Still others may learn better when asked to debate a question like, Did industrialization mean progress? By providing a variety of entry points, teachers not only reach more students but also invite their students to think about important problems in multiple ways—a mental agility that characterizes the disciplined mind.
- *Develop performances of understanding.* Performances of understanding invite students to think with knowledge in multiple novel situations; they show whether students can actually make use of classroom material once they step outside the door. For example, in the unit on industrialization, teachers may present students with conflicting accounts of workers' experiences in the 1884 planned model industrial town of Pullman in Illinois—a case that students have not yet been coached to examine. In their analysis of the Pullman strike of 1894, some historians contend that Pullman's model community was a malicious design to exploit workers; other historians believe it was the result of naïve paternalism. Teachers might ask students to use what they have learned about historical inquiry to explain how expert historians could disagree. Students with a disciplinary mind in history would understand that they need to examine the conflicting accounts, check the sources used, take into consideration the date of the account, and clarify the historian's perspective. In doing so, students will develop a more informed understanding of historical accounts and will be able to apply their insights in other performances of understanding.

What the Future Requires

Today, the information revolution and the ubiquity of search engines have rendered having information much less valuable than knowing how to think with information in novel situations. To thrive in contemporary societies, young people must develop the capacity to think like experts. They must also be able to integrate disciplinary perspectives to understand new phenomena in such fields as medicine, bioethics, climate science, and economic development. In doing so, the disciplined mind resists oversimplification and prepares students to embrace the complexity of the modern world.

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Linking to Prior Learning

Yu Ren Dong

Several easy-to-implement strategies can help teachers support language learners in all content areas.

Julieta, an English language learner from Argentina who came to the United States at the beginning of the year, sat in her 9th grade world history class, reading the following passage:

Rome Begins: While Athens and Sparta were at the height of power, another great early civilization was starting. In another part of the Mediterranean Sea area, Rome was born. About 1500 BC, a tribe called the Latinos crossed the Alp Mountains into what we now call Italy. They settled along the Tiber River. The land was good. It was easy for the people to raise their cattle and crops. These people were the first Romans.

From the outset, Julieta had difficulty with the phrase *height of power* in the handout. She quickly punched the words into her electronic translator. It didn't help. She soldiered on, bogged down by more unknown words: *civilization, Mediterranean, tribe, settled*. The teacher initiated questions to check for students' understanding of the passage, but Julieta was so busy searching for word meanings that she heard little of what the teacher said and how her classmates responded.

After class, Julieta explained, sighing, "Sometimes even the words that the teachers say in class are new and hard for me to understand. I

get confused. I don't have time to look up everything in my electronic translator." Julieta felt that it wasn't typical of her to get so lost; she had been a straight-A student in her school in Argentina.

Language Overload

Like Julieta, many English language learners find themselves sitting in mainstream subject-matter classes confronted with an overwhelming vocabulary load in both the assigned reading and class discussions. The language overload is compounded by the need to learn challenging disciplinary-specific knowledge and skills, meet rigorous graduation requirements, and pass standardized tests.

To reduce the vocabulary overload that English language learners experience, some mainstream subject-matter teachers use such strategies as referring the students to the textbook glossary and encouraging them to use a dictionary or an electronic translator. But as Julieta pointed out, it's often difficult for students to consult the dictionary while engaging in class discussion, reading the textbook, and copying notes from the board. In addition, textbook glossaries and dictionaries are not always helpful because the definitions themselves may contain unfamiliar words.

One support strategy that mainstream subject-matter teachers *can* use is activating English language learners' native languages and prior knowledge (Cummins et al., 2005). Some teachers have concerns in this area, however. Students' prior knowledge is encoded in their native languages and acquired through schooling in their native countries and sometimes may not be the appropriate prior knowledge that the teacher anticipates. For example, some English language learners may have different prior knowledge concerning the word *propaganda*. The word for propaganda in Chinese means passing on information in a good sense. This is not congruent with the prior knowledge that the teacher has in mind when she discusses the propaganda that the Nazis used in World War II.

Also, some subject-matter teachers may not be convinced about the merits of introducing students' home languages in the classroom. Some teachers may fear that students will use their native languages as a crutch that will ultimately impede their learning of English. Other teachers may fear that their own lack of understanding of the students' native languages may impede their ability to support student learning of the subject matter in English.

Second-language research has repeatedly shown, however, that English language learners' native languages and prior knowledge play important roles in learning subject-matter knowledge in English (August, Carol, Dressler, & Snow, 2005; Meyer, 2000; Rubinstein-Avila, 2006). According to Cummins (1979), the linguistic and cognitive interdependence between the first and second languages facilitates rather than impedes students' learning of English in general and of academic English in particular. This interdependence becomes even stronger as the student moves into higher grade levels (August et al., 2005).

What Teachers Need to Know

Over the years, in a teacher education class I've taught for secondary preservice teachers, I've worked with my students to develop effective language support for English language learners in subject-matter classes. As part of the course, the teachers must observe an English as a second language class to develop sensitivity to and awareness of learners' needs and to learn effective teaching strategies. Students also keep a journal to document their growing knowledge.

Working in their subject-matter groups, the preservice teachers examine the teaching materials used in mainstream secondary subject-matter classes, ranging from textbooks to extracted passages, from novels to laboratory manuals. The teachers learn to think from the perspective of English language learners, identify prior knowledge that students might bring to the lesson, and highlight difficult words and cultural concepts. In their observations, they also have identified

helpful teaching strategies, two of which have proven most effective: using cognates to help students understand challenging English academic vocabulary and activating prior knowledge.

Cracking the Code with Cognates

Those of us who have learned a second language can remember when we first encountered an unknown word in the new language. Our brain automatically searched for patterns or similarities between the new language and our native language to help us understand the new concept or word (Cummins, 1979; Dong, 2004; Short & Echevarria, 2004/2005). This mapping of a new word in the second language to a cognate or translational equivalent in our native languages has been proven to be a successful strategy (Freeman & Freeman, 2009; Kieffer & Lesaux, 2007; Rubinstein-Avila, 2006).

Despite the occasional mismatches, such as false cognates, the benefits of using cognates to learn far outweigh the drawbacks. Researchers have noted a tremendous possibility for cross-language transfer through cognates, especially for native Romance language speakers learning academic English vocabulary (August et al., 2005; Freeman & Freeman, 2009; Kieffer & Lesaux, 2007; Rodriguez, 2001). A large number of academic English words are similar in both spelling and meaning to Spanish words, and Spanish-speaking English language learners can use these words as a rich resource in their acquisition of English vocabulary.

Many of my preservice teachers who are French and Spanish native speakers have mentioned that this is how they learned academic English. To illustrate how students' native languages can help them learn English, John, a native-Spanish-speaking preservice teacher, modified a reading passage on hibernation from a science textbook (Brockway, 1985, p. 128) by highlighting Spanish-English cognates:


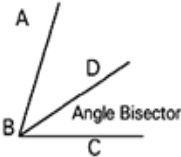
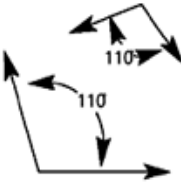
Hibernation(*Hibernación*)

In the fall, mammals (*mamíferos*), such as mice and squirrels, gather and store food. Woodchucks and skunks develop thick layers of fat. These adaptations (*adaptaciones*), and others (*otros*), help many animals (*animales*) survive the cold winter months when food is scarce. Some birds and insects (*insectos*) migrate (*emigran*) from the forest to warmer climates (*climas*) where food is abundant (*abundante*). Small animals, such as snakes and chipmunks, spend the winter in burrows in a sleep-like state called hibernation (*hibernación*). During hibernation an animal's body temperature (*temperatura*) is lower and its heartbeat and breathing rates decrease. Hibernation allows an animal (*animal*) to survive the winter on very little energy (*energía*). In the spring the animal “wakes up.”

English language learners see that they have an extra tool to help them crack the code of daunting academic vocabulary words in English.

Teachers who have no knowledge of Spanish can ask their Spanish-speaking students to identify cognates and include them in the lesson for language support. Vincent, a preservice mathematics teacher, was planning a lesson on the angle bisector theorem for a group of five 10th grade students in a beginners' class in English as a second language. With a visual glossary that he prepared beforehand, Vincent began the lesson by asking his students about the English equivalent of such words as *triangle*, *vertex*, *congruent angle*, and *theorem*. He was delighted to discover that his students recognized many of the cognates and understood their meanings because they had learned these concepts previously. All five students' knowledge in mathematics was more advanced than that of their grade-equivalent U.S. peers. Teachers can expand Vincent's glossary (see fig. 1) to include equivalents in other languages.

Figure 1. Multilingual Geometry Picture Glossary

Angle Bisector Theorem: If two sides of a triangle are congruent, then the angles opposite these sides are congruent.					
English	Spanish	French	Portuguese	Chinese	Korean
Triangle 	triángulo	triangle	triângulo	三角形	삼각형
Angle bisector 	Bisector de anglo	Ligne de bissection de montage	Bissetor de ângulo	角平分线	각도를 이등분
Congruent angles 	ángulos congruentes	angles congruents	ângulos congruentes	等角	합동 각도

For a complete picture glossary, see www.ascd.org/ASCD/pdf/journals/ed_lead/el200904_dong_glossary.pdf.

By shifting English words to students’ native-language equivalents, teachers direct students’ attention toward something they already know. Teachers can ask students to translate key words in their native languages and discuss them along with the English definitions. Com-

parisons between languages also lead to a discussion of academic vocabulary at a higher level.

Activating Prior Knowledge

Most secondary English language learners begin learning English with an already developed ability to think, speak, read, and write in their native languages. Although some students may have disrupted schooling or limited native-language literacy, others may have more advanced knowledge and skills in certain academic subjects than their native English-speaking peers.

Although activating prior knowledge before learning new knowledge is an important teaching practice for all students, it is especially important for language learners. Language learners often don't connect their prior knowledge to the content matter they are learning in English. They may assume that their native languages and prior knowledge are too different to be relevant.

Writing About Their Literacy Experiences

One way to draw on English language learners' prior knowledge to is to invite these students to talk and write about their previous literacy experiences (Dong, 2004). Many of the preservice subject-matter teachers have noticed that students will respond enthusiastically when the teacher demonstrates a sincere interest in their previous learning.

To familiarize themselves with their students' literacy backgrounds, English teachers might ask the students to write answers to some of the following questions:

- What is your native language?
- When and how did you learn to read and write in your native language?
- Which book or writing assignment do you remember in your native language and why?

- How did your teacher back home teach you to read and write in your native language?
- Do you read or write in your native language now? If so, what do you read or write about?
- What are the similarities and differences between schools in the United States and schools in your native country?

Teachers can encourage students who have difficulty writing in English to write their answers in their native language. Either native-language peers or a bilingual teacher can translate their comments into English. Other subject-matter teachers can use this writing exercise to learn about their students' previous learning experiences, whether they be in science, mathematics, social studies, or another content area.

For example, John, a Chinese 8th grade student, wrote about the kind of books he loved reading as a child:

The first book I ever read is a Chinese book called *Funny Master*. It's about an old man who is very funny, and he tells jokes in the book. I like his jokes. I love to write stories about myself in those funny books. Now I am in the 8th grade, and I don't read those funny books any more.

Maria, a 10th grader, wrote about her extensive background in reading in her native China:

When I was in China, I loved reading books. I always started reading as soon as I got home and usually forgot to do my school homework. Because of this, my dad yelled at me a million times. ... He felt that math was more important than literature. ... I still read and write in my native language. I read a Chinese newspaper called *World Journal* every day, usually about half an hour to an hour. I also write my daily journal in Chinese, not so often though, maybe I should call it a weekly journal, and sometimes even a monthly journal.

Kim, a 9th grader from Korea, described how she became more confident in her writing:

The most influential book I read was a book about a Korean emperor. I got it for Christmas. In Korea, teachers check your journal entries every day. I wrote about my trip to a mountain, and I received a certificate for it. That was the first piece of writing that I received a certificate for, and I was proud of it. In the 3rd grade, my teacher congratulated me on my writing because I copied down the whole book. That made me more confident as a writer.

Some students, such as an 11th grader named Sam from Colombia, explain the differences in schooling between their native countries and the United States:

In Colombia ... we have the same teacher for all classes or sometimes we have a different teacher, but we stay in the same room. But here [in the United States] we have different rooms and different teachers. Another difference is that the teacher in my country speaks Spanish and teaches in Spanish. But here many teachers can speak Spanish, but they don't teach in Spanish. The textbooks we use here for social studies talk about America and Colombia, not like the books we had back in Colombia, it was all about Colombia. But in math they teach the same as it is here.

These students' writings offer a window into their previous education and can help teachers modify instruction according to students' strengths, weaknesses, and interests. For example, after reading about John's interest in Chinese funny books, his English teacher might want to include comic book reading and writing to sustain John's interest and facilitate his language learning.

Connecting with Students' Historical Knowledge

Many English language learners have already studied history in their native countries. Numerous topics in the world geography and history curriculum provide social studies teachers with opportunities to connect to their students' prior historical knowledge (Salinas, Franquiz, & Guberman, 2006; Salinas, Franquiz, & Reidel, 2008; Short & Echevarria, 2004/2005). Teachers can invite students to share their perspectives on historical events or important figures in world history with the rest of the class.

For example, in teaching the Korean War, the social studies teacher can engage the class in reading not only U.S. texts but also a Korean companion text (see Lindaman & Ward, 2004) for a side-by-side comparison. See an example at www.ascd.org/ASCD/pdf/journals/ed_lead/el200904_dong_comparison.pdf). Students from Korea can play a cultural insider's role by sharing their views and understandings of the war in either their native language or English. The teacher might ask such questions as, How are the two accounts of the Korean War similar and different? and Which account do you think is more accurate and why? In so doing, the teacher not only creates a comprehensible and meaningful learning environment in which to teach the new concepts, but also encourages a more in-depth discussion of the Korean War and related concepts. This will also lead to an exploration of the perspectives and possible biases of history textbooks, thus facilitating students' development of critical-thinking skills. Students come to view the writing of history as a dynamic process, which often reveals multiple views of the past (DeRose, 2007).

Making the Connection

English language learners' previous cultural, language, and literacy experiences influence their ways of learning both English and subject-matter knowledge. Their native languages and prior knowledge are rich

resources to tap into. When teachers invite English language learners to link new knowledge to what they have already learned, learning becomes more comprehensible, meaningful, and exciting.

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Author's note: All names used in this article are pseudonyms.

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Stepping Beyond Wikipedia

William Badke

*Students need to learn to navigate the sea
of information that surrounds them.*

A few months ago, I needed to send an urgent message to a young woman I barely knew. I didn't know how to reach her. No phone number, no e-mail address, no address of any kind. So I went on Facebook, found her profile, and sent her a note. To my surprise, she answered a couple of minutes later. She was having her Facebook messages forwarded to her cell phone.

As someone who predates the Internet by many years, I'm still surprised at what we can do these days. The Internet is the biggest revolution in information since the printing press. Never before has so much information been so freely available to so many people. Not only that, but the average high schooler can run rings around the technology available—or so the mythology goes.

The New Information Reality

Wikipedia is a great example of the new information reality. Written by almost anyone, with only a cadre of volunteer watchdogs to guard its content, it has become the most frequently used encyclopedia in the world. The sheer audacity of creating an information resource of this scope, essentially controlled by no one and everyone, is mind-boggling. It runs counter to all the previous rules about quality control

and gatekeeping; yet, for the most part, it's pretty reliable. An article in *Nature* a few years ago (Giles, 2005) found that the reliability of Wikipedia was only slightly less than that of *Britannica*.

Still, there are some biased or incorrect entries. How can we determine whether the information in sources like Wikipedia is reliable and of sufficient quality for students to use? In the good old days (pre-1990), it was relatively simple. You looked at the authors' credentials, the reputation of the book publisher, or the venue within which an article was published (scholarly journal, trade magazine, or popular publication). There were gatekeepers—serious editors who turfed out the trash and published only the worthwhile. Maybe it wasn't actually quite as pristine as that, but both teachers and students had some concrete measures to determine what information was worth considering and what was not.

No longer. I recently did a Google search on "risk taking." The first Web site in the result set was the product of a British professor who published most of his work in prestigious journals. The second had been created by (or for) a self-help guru with dubious credentials in mathematics and software development, who has now devoted his life to telling other people how to run theirs.

Are Students Prepared?

The uneven quality of today's information is only the beginning of the problem. Sadly, the average high school student lacks the skill to assess online information. Study after study has shown that high school and university students are overconfident about the reliability of Web sites and lack the ability to evaluate them effectively (see Wang & Artero, 2005). In fact, our assumptions about the technological abilities of our youth in general may need a rethink. A British study released in 2008 found that "the majority of young people tend to use much simpler applications and fewer facilities than many imagine" (University College London CIBER Group, 2008, p. 18), and "the wider availability of

technology and the near blanket exposure to it in recent years does not appear to have improved search performance in any significant way” (p. 22).

The wide diversity of information sources available today—compounded by the common teenage perception that all information is equally useful and usable—creates a growing problem. The typical high school student appropriates information (inefficiently) from any number of venues, including YouTube, podcasts, and so on; mashes it up; and creates projects with little regard for quality, accuracy, or the niceties of rules against plagiarism.

A 2003 Canadian survey of 3,000 incoming university freshmen found that most included inessential words in searches; used the Boolean operator “or” incorrectly; could not identify the characteristics of scholarly journals; could not distinguish between library catalogs and bibliographic databases; and had difficulty identifying journal article citations, knowing when to cite sources, and evaluating Web sites (Mittermeyer & Quirion, 2003). These recent high school graduates’ information skills left them unprepared for further academic work.

Clearly, the time to educate students about the new information reality is in elementary, middle, and high school. The ability to work with information, whether in written, audio, or video form—to define a problem, understand the nature of the information available, use the best tools well to find the information needed, and then enlist the information effectively and ethically to address the issue at hand—may well be the most important skill of the 21st century.¹ Yet few K–12 educators keep information literacy on their radar, let alone understand how to teach it.

Can Information Literacy Be Taught?

“Students will pick up information skills on their own. Just turn them loose in a good library. They’ll figure it out. What’s so hard about learning to do research?” I hear comments like this all the time, and they

dismay me. The “information literacy by osmosis” argument has been debunked by reams of research showing that even university students do not learn how to handle information on their own. They must be taught (see Gallacher, 2007). But is that even possible?

One common approach is the library orientation or, as librarians call it, the “one-shot.” This approach devotes an hour or two to familiarizing students with the essentials of how to use a library (including a few databases and maybe some cautionary instruction about the Internet). One-shots generally fail to produce much actual learning—not just because they are brief but also because they are remedial. They separate out a learning task from the main curriculum, inject that learning task into students, and then bring students back to the curriculum, supposedly inoculated from information illiteracy.

A more viable approach is to give information literacy a foundational role in our instruction. This requires us to reorient the way we teach. Most educators are well aware of the active-learning, constructivist, student-centered approach to instruction, which holds that when students discover things for themselves and attribute personal meaning to the subject matter, they learn more deeply and acquire a more permanent knowledge base. Information literacy instruction has a natural home in active learning.

Combining Information Literacy and History

Let’s consider an average high school course covering the history of the modern world. You reach the early 20th century and decide to have your students work in groups to explore the causes of World War I. Here’s how the process might look if, instead of simply turning students loose, you integrated information literacy into instruction.

Help Students Define the Problem

Have your students do initial research and then identify one essential question to answer. In this case, the question might be, Of all

possible causes of World War I, which was the most significant? Was the murder of the Archduke really as important a cause of World War I as many people believe? or How could World War I have been avoided?

Emphasize that this project requires students not just to summarize information, but to analyze it: to sift through events and possible causes to determine the most significant one. Students should think of information as a tool to solve a problem rather than as the goal of research. It's not enough to find a couple of encyclopedia articles on the causes of World War I and summarize or synthesize the information without adding any real thought of their own.

Familiarize Students with the Available Information Sources

Most students will want to turn first to Google or Wikipedia. If so, they need to understand that they may encounter inadequate or biased material. They should consider alternatives, including the library catalog, journal databases, and academically credible Web sites.

Using a library catalog (ideally in digital form), they should look for books dealing with World War I, any of which will likely cover causes of the war. The library catalog can also direct them to reference sources—for example, a dictionary of modern world history—where they can find concise material on their topic.

Broad-based article databases such as EBSCO's Academic Search, Gale's Info-Trac, or the Directory of Open Access Journals (www.doaj.org) enable students to capture credible journal articles, many of which are available in full electronic text within the database. When students are used to consulting only Web sites, it's worth emphasizing that a peer-reviewed journal article can be useful in confirming the truth of what the Web sites say.

To pull up credible Web sites, have your students go to Wikipedia ("Origins of World War I") and scroll to the bottom of the article, where they will find a bibliography and some Web site links (including one to a fascinating simulation game on the causes of the war:

www.activehistory.co.uk/WW1_CAUSES/index.htm). The reference section of a Wikipedia article is often a good source to discover the more academically sound resources, many of which have been published by more traditional or peer-reviewed methods.

Teach Students to Use These Resources

Most students lack expertise even with Google, let alone with more sophisticated databases. Teach students how to use these tools to their advantage (see Badke, 2008), showing them the value of ensuring that their Web site results include sources that have been peer reviewed.

For Google searches, suggest that students try the advanced features, such as phrase searching, searching with synonyms, or searching only within Web site titles to get more precise results.

If your library lacks journal databases, insist that all your students get borrowers' cards for the local public library, which generally has access to a database or two. Teach them Boolean logic with keyword searching so that they can formulate searches that get them just the information they need. For example, in a journal database, they might use the following search: (World War One or WWI or First World War) and (cause or origin).

For the library catalog, get students started with a keyword search for books (World War One, First World War, and so on). Then have them open the title link of one of the relevant books in the results to get a fuller description. There they'll find a further link to a subject heading (World War, 1914–1918). Clicking on this link will give them access to more books on the same topic, regardless of what specific terminology is used in a book's title. All library catalogs have subject heading searches, and many journal databases have a "narrow by subject" option.

Teach Students How to Evaluate Resources

Students need to learn to ask themselves questions about their sources: Who wrote this? What qualifications do they have? What biases do they have? What is the level of writing? Does it have notes or references? Is the language at a basic or an advanced level? and so on. A useful guide to evaluating resources is the CARS checklist in Figure 1 (Harris, 2007).

Figure 1. Summary of the CARS Checklist for Research Source Evaluation

Credibility	Trustworthy source, author's credentials, evidence of quality control, known or respected authority, organizational support. Goal: an authoritative source, a source that supplies some good evidence that allows you to trust it.
Accuracy	Up-to-date, factual, detailed, exact, comprehensive; audience and purpose reflect intentions of completeness and accuracy. Goal: a source that is correct today (not yesterday), a source that gives the whole truth.
Reasonableness	Fair, balanced, objective, reasoned, no conflict of interest, absence of fallacies or slanted tone. Goal: a source that engages the subject thoughtfully and reasonably, concerned with the truth.
Support	Listed sources, contact information, available corroboration, claims supported, documentation supplied. Goal: a source that provides convincing evidence for the claims made, a source you can triangulate (find at least two other sources that support it).

Source: From "Evaluating Internet research sources," by Robert Harris, 2007, *Virtual Salt*. Available: www.virtualsalt.com/evaluat8it.htm. Copyright 2007 by Robert Harris. Used with permission.

For example, suppose I've found a Web site on the origins of World War I: www.firstworldwar.com. To evaluate it using the CARS checklist, I first look at *credibility*. What is www.firstworldwar.com, and who is behind it? I find a linked name, Michael Duffy, at the bottom of the page and click on it. This takes me to an "About This Web Site" page, where I find a recommendation that the material not be used for academic research because it has not been peer reviewed. Mr. Duffy does not provide his qualifications.

Then I look for *accuracy*. Although not updated since 2006, the site does appear to have factual information. On *reasonableness*, the site is even-handed, not prone to talking about conspiracies, and not taking only one side on issues. Finally, *support*. Although most articles on the site lack footnotes and bibliographies, there is an extensive collection of primary sources—actual documents, posters, and so on from the World War I era. The feature articles have bibliographies.

My verdict? Although not peer reviewed, this site appears to be a reasonably reliable source for information, especially for primary source material. It is therefore usable with care and discretion, but not for higher-level academic work.

Guide Students in Using Information Effectively

In addition to locating, gathering, and evaluating information, students need to learn how to stick to their goal, capture the good stuff from what they're reading while weeding out the useless, and structure their product, whether it's a report or a research paper.

Straying from the goal is a common problem. Many projects on the origins of World War I will devote most of their space to describing events, failing to leave enough room for analysis of the tensions behind those events, which is the goal. Students often include extraneous details that don't contribute to the main issue.

In taking notes on the information they find in various sources, students may need to learn how to identify the main ideas and separate those out from unnecessary details. Here, group work can be used to good effect as each member presents a portion of the gathered material to the others and they decide together how it all fits.

Analyzing the data in light of the key question or goal they are working with will help students figure out how to outline their final products. Students will need to develop an outline *before* writing or creating their product. For example:

Was the murder of the archduke really as important a cause of World War I as many people believe?

1. Introduction—Brief explanation of pre-WWI events.
2. The argument that the murder of the archduke was the main cause.
3. Evaluation of that argument.
4. Conclusion.

The resulting outline becomes a blueprint to guide the production of the final report, using gathered information as a tool to accomplish the research goal.

Teach Ethical Use of Resources

Plagiarism is an increasingly challenging problem for educators and students. If I can easily pull information from various Web sites with a simple copy and paste, mashing it up into a research report in which few words actually came from me, why shouldn't I do it? Web sites are free, so they're available for my use, right?

To counter such ideas, it's important that we teach students directly what plagiarism is—for example, with a tool like the tutorial “Plagiarism, eh?” (www.acts.twu.ca/lbr/Plagiarism_Short.swf). We need to convey to students the following:

- Easy access to something does not mean that I can claim it as my own. If I leave the impression that someone else's words are mine, I'm telling a lie and stealing information. I'm also telling the world that the words and ideas that come out of our brains do not belong to us. If that's true, then anyone can steal my words and ideas just like I've stolen theirs.
- When I steal information produced by someone, I separate the author from what he or she has written. The authority for writing anything comes from its author. If I pass off an expert's writing as my own, then I diminish it, because I can't reveal

who the real author is. In the process, that piece of writing loses most of its power.

- Good research is a discussion: “Jones has argued that But Smith disagrees when he says Both Jones and Smith have missed the point, however, because . . .” If I interact with the writings of other authors rather than passing off those writings as my own, I have lots of opportunity to show I’m in tune with the best ideas about the topic.
- Plagiarism is fairly easy to detect these days (for instance, through a Google search), so there’s a very good possibility of getting caught.

The Foundation of Everything

The way to create information-literate students is to make information study the foundation of all subject matter we teach.

Instead of simply telling our students the facts, or even sending them out to find the facts for themselves, we need to help them navigate the sea of information that surrounds them. This means constantly asking them such questions as, What information do you need to address that question? What’s the best way to find that information? How will you evaluate what you’ve found? How can you harness that information to provide the best answer to your question?

When students’ first step in any learning task is to think about information, their skill in acquiring and using available resources will grow. The result will be literate students who are able to handle the demands of our information-based age.

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Endnote

¹ For detailed definitions of and standards for information literacy, see *Standards for the 21st Century Learner* (American Association of School Librarians, 2007; www.ala.org/ala/aasl/aaslpfoprof/tools/learningstandards/AASL_Learning_Standards_2007.pdf) and *Information Literacy Competency Standards for Higher Education* (Association of College and Research Libraries, 2000; www.ala.org/ala/mgrps/divs/acrl/standards/informationliteracycompetency.cfm).

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The Importance of Deep Reading

Maryanne Wolf and Mirit Barzillai

What will it take for the next generation to read thoughtfully—both in print and online?

Of the three lives Aristotle speaks of, the life of action, the life of contemplation, and the life of enjoyment, we have the two, action and enjoyment, but we lack the other, contemplation. That, I thought, is why ours is a violent city.

— John Dunne

A culture can be judged, in Aristotle's view, according to how it pursues three lives: the life of activity and productivity, the life of enjoyment, and the life of contemplation. As our society ineluctably transitions from a print-based to a digital culture, it is important to examine how this transition influences these three lives.

The digital learner seems particularly well-suited for a life of activity and a life of enjoyment. The emphases of digital media on efficient, massive information processing; flexible multitasking; quick and interactive modes of communication; and seemingly endless forms of digitally based entertainment encourage such lives. These emphases, however, can be less suited for the slower, more time-consuming cognitive processes that are vital for contemplative life and that are at the heart of what we call *deep reading*.

By *deep reading*, we mean the array of sophisticated processes that propel comprehension and that include inferential and deductive reasoning, analogical skills, critical analysis, reflection, and insight. The expert reader needs milliseconds to execute these processes; the young brain needs years to develop them. Both of these pivotal dimensions of time are potentially endangered by the digital culture's pervasive emphases on immediacy, information loading, and a media-driven cognitive set that embraces speed and can discourage deliberation in both our reading and our thinking.

Such a perspective presents a Gordian knot of cognitive advantages and challenges for the present and upcoming generations, which, if unaddressed, could affect the already diminishing role of contemplation in our society. Moreover, these emphases of the digital culture may radically change how we learn to read and acquire information. And they may well change how we think.

There is some historical irony here. The ancient Greeks raised similar concerns during a related historical shift—the transition from an oral to a written culture. As reported by Plato, Socrates cautioned his society *against* learning to read. He believed that literacy could alter the kind of memory and probative processes required for the young to deeply pursue and internalize knowledge. He worried that the seeming permanence of writing would delude young people into thinking that they had learned the “truth,” when they had just begun the search for it.

Will factors inherent in the digital medium produce similar issues for today's young learners? Will the digital culture produce changes in the more cognitively demanding deep-reading processes? And could these changes have unintended effects on the intellectual development of generations to come? We can gain insights into these questions by examining how the brain learned to read.

The Brain—Rewired

Human beings were never born to read (Wolf, 2007). We were born to see, move, speak, and think. Genetic programs unfold for each of these functions as the organism interacts with the environment.

Not so with reading. Reading is a new cognitive function, invented only 5,500 years ago, which translates into about a minute before midnight on the clock of human evolution. Understanding how humans learned to read helps illumine one of the brain's great, semi-miraculous design features—its plasticity. This aspect of the brain enables us to make whole new circuits and connections among our older, genetically programmed structures. In the case of reading, plasticity enables the brain to form new connections among the structures underlying vision, hearing, cognition, and language. This design feature means that the very organization of the human brain enables it to go beyond itself.

This view has fascinating implications for the history and future of literacy. If the brain has no one programmed reading circuit, then circuitries for different languages and writing systems will not all look the same. An increasing amount of cross-linguistic imaging data demonstrates exactly that. All writing systems share some universal structures, but some orthographies use different structural regions and activation patterns (Bolger, Perfetti, & Schneider, 2005).

For example, the brain of a reader of Chinese requires extensive activation of visual regions in the occipital areas, a physiological correlative of the cortical “space” needed for acquiring thousands of Chinese characters (Tan, Spinks, Eden, Perfetti, & Siok, 2005). By contrast, alphabetic reading brains require more processing in the temporal and parietal regions to accommodate the alphabet's early emphases on sounds (phonemes) and the rules of correspondence to visual (letter) symbols. In such a way, the requirements of individual writing systems shape reading circuits in the brain.

The amount and quality of experiences with written language also shape reading circuits. Fascinating differences exist between expert

readers and novice readers, who are just learning to set up their reading circuits. Novice readers in English must learn a great many things—from the not-so-simple alphabetic principle, to the varied sound-symbol correspondence rules in English's orthography, to decoding hundreds of new words. As a result, in the beginning, young reading brains need to activate far more expansive brain regions than adult brains do. Gradually, as the expert reading brain emerges over time, the original reading route changes to a set of pathways that are streamlined for decoding and that can now incorporate ever more sophisticated semantic and syntactic processes (Sandak, Mencl, Frost, & Pugh, 2004).

The properties of print itself also play a role in shaping the reading circuit. For instance, the stability and linearity of printed text as well as the layers of thought and composition that it represents invoke the reader's complete attention to understanding the thoughts on the page. Thus, becoming fluent in the decoding processes enables readers to allocate the time and attention necessary to process the ideas, information, story, and intellectual arguments and assumptions presented. To be sure, such comprehension is not simple, nor does it develop overnight in terms of clues to aid understanding. Little is given to the reader outside the text. For that reason, readers must engage in an active construction of meaning, in which they grapple with the text and apply their earlier knowledge as they question, analyze, and probe. In the process, they learn to build knowledge and go beyond the wisdom of the author to think their own thoughts.

This latter capacity, which we refer to as the Proustian principle (Wolf, 2007), requires great amounts of attention, effort, motivation, active imagination, and time—time for the reader and time for the brain, a few hundred milliseconds to be exact. Depicted in imaging research on comprehension, these milliseconds involved in deep reading require extensive activation of both hemispheres (Keller, Carpenter, & Just, 2001). By the time the expert reader has comprehended a text at a deep level, all four lobes and both hemispheres of the brain have contributed significantly to this extraordinary act—a neural reflection of the many

processes involved. What we read and how deeply we read shape both the brain and the thinker.

Physiologically and intellectually, human beings are substantively changed by the evolving richness of the neural networks that we add through our reading over time. That said, the expert reading brain is not a given. Any reading circuit can emerge, including one that uses only part of its potential.

The Distracted Reader

With digital text, the potential for creativity, learning, and discovery that encourage deep thought is immense. For example, interest in a Shakespearian play can drive a discovery process that links the reader not only to the text of the play and various comprehension supports, but also to relevant historical information, videos of the play, discussion groups, articles from noted literary critics, and artistic interpretations that may drive deeper reflection.

However, this great gift of easily accessible, readily available, rich information has the potential to form a more passive and, as Socrates put it, an even more easily “deluded” learner. Although this is possible within any medium, online reading presents an extreme of sorts with its uncensored, unedited maelstrom of anything and everything that is always available and capable of diverting one’s attention.

As the medium itself offers little in the way of clear boundaries, standards, and organization, the ability to discern these features is a necessary skill for the online reader—in particular, the ability to read critically when considering the quality of text and the reliability of online sources. As Nick Carr opined in his article, “Is Google Making Us Stupid?” (2008), sources are often prioritized on the basis of the number of hits rather than on the quality of information or whether the information comes from an adjudicated source.

Taking advantage, then, of the wealth of information that is always just a click away demands the use of executive, organizational, critical,

and self-monitoring skills to navigate and make sense of the information. Thus, even as this hyperlinked environment offers seemingly endless opportunities to enhance comprehension through easy access to information such as vocabulary and background knowledge, students typically underuse such opportunities (Dalton, Pisha, Eagleton, Coyne, & Deysher, 2002; MacArthur & Haynes, 1995). This behavior suggests that readers have not yet developed the comprehension-monitoring skills and self-awareness necessary to fully avail themselves of the supports of the Web. Students are often unable to evaluate whether links will be useful or simply distracting (Kamil & Lane, 1998). Without this knowledge, they may find themselves mired in irrelevant and unrelated information.

As opposed to the relative linearity of printed text, the very appearance of digital information at once presents both new richness and new challenges for the online reader. The fluid, multimodal nature of digital information enables online readers to become immersed in a subject, both visually and verbally. Even as this presentation of material in several different modes provides the reader with multiple points of entry into a subject, it also opens the door to great distraction. It further requires that the reader understand how to evaluate visual information and make meaning in and across several different modalities. Indeed, some research indicates that elementary-age students are less likely to recall information from a source when it is filled with many pictures and animations in addition to the text (Eastin, Yang, & Nathanson, 2006).

What We Stand to Gain—and Lose

Online reading has the potential to mold a mind adept at effectively finding, analyzing, and critically evaluating and responding to information across several modalities. The participatory nature of the Web may help foster young minds skilled in communicating, collaborating, and creating in new ways. And the deictic nature of technology (Leu, Kinzer, Coiro, & Cammack, 2004)—that is, the almost momentary creation of

new modes of representing information and connecting digitally—may promote problem solving and lifelong learning for many.

However, many of the skills involved in maximizing the potential of digital reading, such as choosing the right search words and locating and evaluating information, require a host of decision-making, attention-monitoring, and executive skills. Many of these skills are known to develop later in life. For example, young children, who are concrete in their thinking and who are just learning to discern fact from fiction, are less likely to successfully navigate the online world and understand all it has to offer.

An early immersion in reading that is largely online tends to reward certain cognitive skills, such as multitasking, and habituate the learner to immediate information gathering and quick attention shifts, rather than to deep reflection and original thought. The immediacy and volume of available information may well delude new learners into thinking they have what they need to know. From a pedagogical perspective, when information seems so complete, what motivation is there to go beneath and beyond it? From a cognitive neuroscience perspective, the digital culture's reinforcement of rapid attentional shifts and multiple sources of distraction can short-circuit the development of the slower, more cognitively demanding comprehension processes that go into the formation of deep reading and deep thinking. If such a truncated development occurs, we may be spawning a culture so inured to sound bites and thought bites that it fosters neither critical analysis nor contemplative processes in its members. As technology visionary Edward Tenner (2006) remarked, it would be a shame if the very intellect that created this new technology was threatened by it.

Encouraging Deep Reading Online

Here lies the crucial role of education. Most aspects of reading—from basic decoding skills to higher-level comprehension skills—need to be

explicitly taught. The expert reading brain rarely emerges without guidance and instruction. Years of literacy research have equipped teachers with many tools to facilitate its growth (see Foorman & Al Otaiba, in press). For example, our research curriculum, RAVE-O (Wolf, Miller, & Donnelly, 2000), uses digital games to foster the multiple exposures that children need to all the common letter patterns necessary for decoding. Nevertheless, too little attention has been paid to the important task of facilitating successful deep reading online.

The medium itself may provide us with new ways of teaching and encouraging young readers to be purposeful, critical, and analytical about the information they encounter. The development of tools—such as online reading tutors and programs that embed strategy prompts, models, think-alouds, and feedback into the text or browser— may enhance the kind of strategic thinking that is vital for online reading comprehension.

For example, programs like the Center for Applied Special Technology's (CAST) "thinking reader" (Rose & Dalton, 2008) embed within the text different levels of strategic supports that students may call on as needed, such as models that guide them in summarizing what they read. In this way, technology can help scaffold understanding (Dalton & Proctor, 2008). Such prompts help readers pause and monitor their comprehension, resist the pull of superficial reading, and seek out a deeper meaning. For example, in the CAST Universal Design Learning edition of Edgar Allan Poe's "The Tell-Tale Heart" (http://udleditions.cast.org/INTRO,telltale_heart.html), questions accompanying the text ask readers to highlight words that provide foreshadowing in a given passage; to ponder clues about the narrator as a character in the story; and to use a specific reading strategy (such as visualize, summarize, predict, or question) to better understand a passage.

Well-designed WebQuests can also help students learn to effectively process information online within a support framework that contains explicit instruction. Even practices as simple as walking a class through a Web search and exploring how Web pages may be

biased or may use images to sway readers help students become careful, thoughtful consumers of online information. Instruction like this can help young minds develop some of the key aspects of deep reading online.

The Best of Both Worlds

No one has real evidence about the formation of the reading circuit in the young, online, literacy-immersed brain. We *do* have evidence about the young reading brain exposed to print literacy. Until sufficient proof enlarges the discussion, we believe that nothing replaces the unique contributions of print literacy for the development of the full panoply of the slower, constructive, cognitive processes that invite children to create their own whole worlds in what Proust called the “reading sanctuary.”

Thus, in addition to encouraging explicit instruction of deeper comprehension processes in online reading, we must not neglect the formation of the deep-reading processes in the medium of human’s first literacy. There are fascinating precedents in the history of writing: The Sumerian writing system, in use 3,000 years ago, was preserved alongside the Akkadian system for many centuries. Along the way, Akkadian writing gradually incorporated, and in so doing preserved, much of what was most valuable about the Sumerian system.

Such a thoughtful transition is the optimal means of ensuring that the unique contributions of both online and print literacies will meet the needs of different individuals within a culture and foster all three dimensions of Aristotle’s good society. Rich, intensive, parallel development of multiple literacies can help shape the development of an analytical, probative approach to knowledge in which students view the information they acquire not as an end point, but as the beginning of deeper questions and new, never-before-articulated thoughts.

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Thinking Is Literacy, Literacy Thinking

Terry Roberts and Laura Billings

In literacy cycles built around Paideia seminars, students practice thinking as a function of reading, speaking, listening, and writing.

Several years ago, we were leading a daylong professional development session in a large school district. As the morning progressed, we noticed that one of the teachers was pointedly not participating. She sat at a table in the media center with her training materials shoved to one side, and it soon became clear that she was using the day to grade student tests and record the marks in her grade book. When we took a break, one of the session leaders walked over to her table and, in as friendly a manner as possible, asked how her students were doing.

She glanced up and without apology replied,

Terrible! I teach algebra, and this is a simple chapter test. I worked and worked to teach them a few simple concepts. Early in the week it seemed like they got it, and their homework papers were improving. Then yesterday I gave them the test, and they bombed it. They not only couldn't transfer what they had learned from one problem to another, but a lot of them couldn't even recall what they had understood two or three days before. I don't know if it's them or me, but something has got to change because this is just an exercise in frustration.

She stood up and grabbed her empty coffee cup, apparently intending to refill it while there were a few minutes left in the break.

“If you can tell me how to make my students understand and remember just a few simple formulas, then maybe I’ll start paying attention to you people!”

“Understand and remember”—those were her words. What she didn’t say was that perhaps her students hadn’t really been asked to understand the few “simple” concepts she was trying to teach them. Apparently, they had memorized some formulas and practiced applying them to a series of numbingly similar homework problems, but because they hadn’t thought deeply about how and why the formulas worked, even their memory of them was fragile.

Thinking as Literacy

At the National Paideia Center,¹ we have struggled with how to teach thinking consistently and effectively. We have come to define thinking as the ability to successfully explain and manipulate complex systems. By system, we mean a set of interrelated ideas, often represented in a human artifact. As students learn to think, they are able to explain and manipulate increasingly complex systems containing many discrete elements and complex relationships. We can find systems in content across the curriculum, from kindergarten through high school. A folktale by the Brothers Grimm, the Preamble to the U.S. Constitution, and a word problem in algebra are all systems. The periodic table of the elements is a complex system.

Our experience with teaching thinking has taught us that learning to think requires frequent, deliberate practice. To become clear, flexible, and coherent thinkers, students need to work with both the process and the product. The only way we have found to teach the process and product of thinking is to recognize the profound relationship between thought and language.

This is not a new idea; as far back as the 18th century, the chemist Antoine Laurent Lavoisier quoted the Abbé de Condillac in arguing that “we think only through the medium of words. ... The art of reasoning is

nothing more than a language well arranged” (Lavoisier, 1799/1984). To teach thinking consistently, therefore, we should treat it as a fundamental literacy skill, whether the language in question is algebra or English. There is no question that reading, writing, speaking, and listening are interconnected skills that develop synergistically. They are also the key to teaching thinking. The more fluent students become as readers, writers, speakers, and listeners, the clearer, more coherent, and more flexible their thinking will become.

To this end, we have developed the traditional Paideia seminar into a literacy cycle of instruction (Roberts & Billings, 1999). In preparing for a seminar, a teacher uses a wide variety of content reading strategies to help students build their comprehension of the system they are studying. The teacher also coaches individual students in speaking and listening skills in a preseminar process session. During the seminar itself, students collaboratively use their reading, speaking, and listening skills. Immediately following the discussion, the teacher leads the students through a postseminar self-assessment. Finally, the students write in response to the system. In each of these five stages, the teacher coaches students in thinking. The whole process is greater than the sum of its parts.

Skilled teachers build a series of seminar-based literacy cycles into their curriculum—ideally, at least two seminars every month. Each cycle in turn asks more from the students as they gain fluency in thinking about ideas.

Thinking About Dickinson

To illustrate how a literacy cycle works, we’d like to invite you into a middle school classroom. In spring 2005, the North Carolina Department of Public Instruction videotaped a seminar cycle in a heterogeneous 6th grade classroom at Guy B. Phillips Middle School in Chapel Hill, North Carolina (Crissman, 2005). The seminar, part of a language arts unit focused on poetry, was on an eight-line poem by Emily Dickinson that

some scholars believe contains Dickinson's definition of poetry: <http://www.americanpoems.com/poets/emilydickinson/1129.shtml>

When we first discussed this text with the two teachers who were leading the project, Nealie Bourdon and Becky Campbell, they questioned our choice because they felt that the poem was too difficult for their students. We argued that we wanted to challenge the students with a poem that would require them to stretch intellectually. We reassured Nealie and Becky that, given the right kind of coaching, the students would rise to the occasion.

The eight lines in Dickinson's poem were the "system" we were asking the 6th graders to "explain and manipulate." There were profound questions inherent to the poem that made this system increasingly complex as the students studied it: What is poetry? What is the nature of truth? How does poetry function in relation to truth? The questions involving poetry were tied directly to the standardized curriculum that Nealie and Becky were responsible for teaching their students, and the even deeper questions involving truth made the whole cycle relevant for the students.

While studying the poem, the students themselves realized that Dickinson's second line ("Success in Circuit lies") reflects the thinking process; successful thought often involves circling a problem multiple times, gaining understanding with each circuit.

Thinking as Reading

Teaching students how to think about a system requires that they first "read" the system by applying a variety of strategies. If the seminar text (or system) had been a math problem, we might have asked students to identify key terms, work in groups to define them, and show their relationships on a graphic organizer. If the seminar text had been an essay on the environment by Rachel Carson, we might have asked students to summarize the text by identifying the topic sentence in each paragraph, listing those topic sentences on a T-chart, and paraphrasing

each in turn. If the seminar text had been a map of South America, we might have asked students to work in teams to analyze the information portrayed by the various symbols in the map legend. In each instance, we would have emphasized that reading comprehension is a form of thinking.

In the case of Dickinson's "Tell all the Truth but tell it slant," Becky and Nealie asked the students to work in collaborative groups to analyze the poem in a variety of ways. One group worked with a copy of the poem that gave only the capitalized words—*Truth, Circuit, Delight, Truth's, Lightning, Children, Truth*—asking themselves what a poem built out of those key words might mean. Another group counted the syllables in each line and identified the rhyme scheme. A third group divided the poem into smaller units, like sentences, and paraphrased each of the units. A fourth made one long list of the words in the poem starting with *tell* and ending with *blind*, alphabetized the list and then asked themselves what a poem made out of just these words (and no more) might mean. The groups then shared their insights with the whole class while students took notes on their own copy of the poem in anticipation of the discussion to come.

Thinking as Speaking and Listening

The next stage in the literacy cycle involves the teacher coaching the students, both individually and as a group, in the speaking and listening skills they will need. After a brief self-assessment, students choose both a group process goal and a personal process goal. The facilitator makes it clear that the goal of the seminar is to think collaboratively about the ideas in the text and that these process skills are what make collaborative thought possible. Both speaking and listening are forms of thinking because they allow a nascent thought to be refined through conversation. The better a student's verbal communication skills, the more quickly his or her thoughts about a complex topic gain clarity and coherence.

In the case of the “Tell all the Truth but tell it slant” seminar, students chose *staying focused* as their group goal because they knew that as a class they tended to stray far from the stated objective. Nealie, who was facilitating the seminar, then asked them to choose one of several individual process goals to guide their personal participation in the discussion: *I will speak at least three times, I will refer directly to the text, I will ask at least two questions, or I will think before I speak.* Students wrote their personal process goals directly on their individual copies of the text so that they would be reminded of them each time they glanced down. After the seminar, Nealie asked the students to self-assess their personal process in writing so that they could set even more appropriate and ambitious process goals in the next seminar.

Thinking as Collaboration

The actual discussion began with students responding to Nealie’s opening question: *Emily Dickinson did not give her poems titles. If you were her editor, what title would you give this poem?* This question allowed all students to offer an opening statement or rough draft of their initial thoughts about the poem. Very quickly, the students began to talk to one another rather than to Nealie: asking questions, building on other students’ comments, and agreeing and disagreeing politely, as they’d been coached to do all year. Teacher Becky Campbell sat in the seminar circle as a participant, and the students challenged her assumptions and asked her questions just as if she were another 6th grader.

At several key junctures, students disagreed with one another and worked to reconcile their different perspectives by further analyzing the text. In response to Nealie’s questions about Dickinson’s use of capitalization, for example, one student said that he believed every word beginning with a capital letter (except the first word in each line) was a synonym for *Truth*. Another student challenged him about whether *Children* was synonymous with *Truth*, and the discussion picked up momentum. As the seminar unfolded, students’ comments became

longer and more sophisticated as they took into consideration previous comments and incorporated multiple points of view.

Students were clearly “explaining and manipulating a complex system” with increasing fluency as the discussion went on. When asked after the seminar whether they understood the poem better than before the discussion, every participant said yes, including the teacher-participant.

Thinking as Writing

Having practiced reading, speaking, and listening in relation to a complex system, students are now fully prepared to write in response to a prompt based on the text and discussion. The goal is for students to produce clear, accurate writing that reflects the maturity of their thought. We ask students to write simply about complex topics, a task that demands that they synthesize their thoughts specifically and precisely into concise sentences. This challenge is a necessary culmination of the thinking process.

Nealie gave her students two options: (1) write an eight-line poem about truth using the same structure and techniques that Dickinson did, or (2) write a personal definition of poetry and its relationship to truth. In both cases, they were dealing with the core concepts in the Dickinson poem and using writing to refine their thoughts even further. Those students who chose to mimic Dickinson’s style and techniques had to demonstrate a mastery of the structure of this particular system—meter, rhyme, capitalization—a challenge that many relished. The work that emerged surprised even the students with its complexity and sophistication.

Examples from Math and History

You might wonder whether this literacy cycle could be replicated with other age groups and in other subject areas. Let’s consider a common

elementary math seminar in which we challenge students to explain and manipulate the system represented by M. C. Escher's artwork *Mobius Strip II*. More specifically, we challenge the students to come to grips with the concept of infinity.

The Mobius strip is a continuous, one-sided surface formed by twisting one end of a rectangular strip 180 degrees and attaching this end to the other. Partway through the seminar, the facilitator typically explains that when turned on its side, Escher's image is the same as the symbol for infinity. Starting with simple definitions of infinity, the students offer examples of things that are infinite and eventually discuss why it is necessary to have a symbol to represent an idea like infinity. This is a striking example of how the literacy cycle can teach vocabulary in a math or science setting—vocabulary that in turn enables more complex thought. After the seminar, students construct Mobius strips of their own using construction paper and tape. They write on the continuous surfaces of their Mobius strips a string of words or images that they think should be rendered infinitely. Their writing is obviously the result of highly personal, highly relevant thinking.

At the other end of the age spectrum, let's consider a literacy cycle in a high school U.S. history class. Embedded in a unit on the creation of the Constitution and the Bill of Rights is a literacy cycle centered on the First Amendment, which guarantees five personal freedoms to individual Americans: religion, speech, press, assembly, and petition. In the preseminar content sessions, students break into five teams, and each team investigates why one of the five freedoms was included in the First Amendment.

After each team presents its background information, all the students discuss how they will actually be practicing their freedom of speech during the seminar and the importance of speaking and listening skills in a democracy. During the discussion itself, the focus slowly shifts from the five freedoms and their interrelationships to the dynamic tension in a democracy between individual rights and social cohesion. Students offer increasingly sophisticated comments about the

importance of both. By the end of the seminar, they begin to articulate how each depends on the other.

After the discussion, the students work on a Student Bill of Rights, which they hope to take to the school governance council for approval. Later in the school year, students will be asked to address complicated First Amendment Supreme Court rulings in the same way, thereby “explaining and manipulating increasingly complex systems.”

Growing Lifelong Thinkers

As Francis Bacon wrote more than 400 years ago, “Reading maketh a full man; conference a ready man; and writing an exact man.” Each stage in the literacy cycle involves thinking about a system in a different way, and all the stages are joined in synergy; it’s not enough just to read about an interesting idea, or to discuss it informally, or to write about it without preparation. Rather, to teach students to think in a consistent and deliberate way, we have to practice thinking in concert with the full range of literacy skills—probably in the order that Bacon himself prescribed.

There remains, of course, the challenge of assessing student thought so that we can measure it as it matures. In teaching thinking as a function of literacy, we assess the process as well as the product, collaborating with students to identify their strengths and weaknesses as readers, writers, speakers, and listeners so that we can continue coaching those skills through successive cycles. In addition, we assess the product of thought in a way that teaches thinking, meaning that we evaluate student writing at the end of the cycle through rubrics that define what clarity, flexibility, and coherence look like in written form. Finally, we take into account the increasing complexity of the systems that students are asked to think about, so that we can show them how to address larger and more intellectually demanding concepts over time.

Our experience has convinced us that thinking can be defined, taught, and assessed. More important, creative and coherent thought is an attribute of a life-long learner. By teaching students to think, we prepare them not only for employment and citizenship, but also for leading abundant lives.

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- ¹ For more information about the National Paideia Center, visit www.paideia.org.

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Little Philosophers

Katie Goodman Le and Carol L. DeFilippo

Socratic seminars can help even the youngest learners think critically and creatively.

During the last hour of the school day at Hunters Woods Elementary School for the Arts and Sciences in Reston, Virginia, a group of kindergarten and 1st grade students are huddled in a circle with a parent, enmeshed in a philosophical discussion. They've just read Langston Hughes's "Poem,"¹ in which the speaker tells how he misses a friend who has gone away. Now they're wondering what the poem means.

"I think Langston was sad because his friend died," one student says.

"It doesn't say he died for sure," a classmate responds. Another student agrees, adding, "Maybe his friend just didn't want to play with him any more."

Such sophisticated thinking for 5- and 6-year-olds! But these students didn't start out thinking of poetry in this way. They are participating in a pilot program based on the Socratic seminar method and adapted for young learners and parent volunteers. Their movement toward this high level of discussion began with both of us—the school's reading specialist and the gifted and talented specialist—trying to discover a meaningful way to provide reading enrichment for our younger learners.

Partnering with Parents

Five- and six-year-olds are renowned for their innate curiosity. Their never-ending questions and desire to share ideas verbally are a perfect fit with Socratic seminars—high-level discussions that help focus thought, encourage questions, and develop critical- and creative-thinking skills. But how could we provide this level of engagement for our students?

We realized that parents are often looking for compelling ways to work with their children and improve the quality of conversation at the dinner table. How efficient, then, to train parents on the seminar method, putting essential elements of high-quality discussion right in their hands.

We developed a Socratic seminar pilot program that consisted of four 45-minute poetry lessons. Poetry was a logical choice because its density in meaning allows for rich conversations in a manageable amount of time. Through fliers sent home to all families in the school, we recruited seven parents who were interested in working with kindergartners and 1st graders for literacy enrichment. The diversity among the parents was representative of the cosmopolitan makeup of our student body. All but two of our parent volunteers had children in kindergarten and 1st grade.

In a one-hour training session, we introduced the Socratic method, presented the seminar's framework for developing questions and facilitating discussion, and addressed group management expectations. To ensure that parents had a clear idea of what the seminars would look like, we closed the training session with a seminar using E. E. Cummings's "In Just—." We also created a take-home handbook that provided background information on the Socratic method and the lesson plans and other tools needed to implement the program.

Even though several of the parent volunteers worked full time, most were able to incorporate the sessions into their schedules. With the help of the classroom teachers, we created six groups of eight

students each. All 1st graders reading on grade level participated, and kindergartners were selected by their classroom teachers on the basis of their reading skills. Having eight students in a group allowed for a range of ideas even if one or two were absent. We balanced these groups by gender, ethnicity, teacher, and students' reading ability. Student groups met with the same parent for 45 minutes every other week.

Listening In: A Seminar on "Poem"

A glimpse of a seminar on Langston Hughes's "Poem" shows how a parent might begin a seminar:

The poem we are going to read today is quite different from a lot of the poems you have seen. This poem is very short, and it talks about feelings. That's true about a lot of poems you will read. I'm going to wonder about how this poem makes you feel and what pictures it brings to your mind. I think we will have a lot to share with one another about this sensitive poem.

Each student has a copy of the poem to follow along with when listening to the parent read the poem aloud the first time. Then they all join in and choral read the poem a second time.

Next, the parent introduces the third reading, "I'm going to reread it one more time. This time, let me know when you have a question so I can stop to write it down. That way, I can capture all your wonderings so we will have lots to discuss."

The parent begins to read the poem again. "'Poem' by Langston Hughes."

"Why does he call it 'Poem'?" Nikko wonders aloud. "That's a funny name for a poem." The parent writes Nikko's question on the chart paper for everyone to see and continues with the poem.

"I loved my friend," the parent reads. Several hands are up in the air now. "Claire?"

“Who’s his friend?” Several other children chorus that that was their question, too.

Other student questions include, Why did his friend go away? Why does he say “there is nothing more to say” and then says more things? How can a poem be soft? Together, the parent and students study the list of questions to see which are the most compelling.

“What great wonderings!” says the parent. “I heard a lot of you wonder who Langston Hughes was writing about. Let’s begin with ‘Who is the friend?’”

“Why didn’t he tell us his friend’s name?” asks Yolanda. “If he’s important enough to write a poem about, he should be important enough to tell his name.”

“Maybe he didn’t want his other friends to be jealous,” says Jacob.

“Maybe it doesn’t even matter who it was, maybe he just wrote it to feel better,” suggests Priya, a sensitive 1st grader.

“Well, I think the friend mattered a lot,” insists Claire.

The parent interjects, “What do you think it means when the poem says he went away?” Danny has his hand up for the first time that week.

“I think he moved away like my friend Varun moved away this year,” he says.

“I remember Varun!” says Kari. “Was he your friend too? Are you sad that he isn’t here anymore?”

Danny nods, and the parent says, “Kari asked if Danny was sad about Varun leaving. Do you think that Langston Hughes wrote ‘Poem’ to be a sad poem?” Many of the students nod their heads, but not Jessie, who is frowning and looking thoughtful. “What are you thinking, Jessie?”

She points to her copy of the poem. “It has the word *soft* in it, and soft doesn’t make you feel sad. Soft is nice.”

“Yeah,” agrees Kari, “and I think the most important word in this poem is *loved*, and that isn’t sad either!”

After about 10 more minutes of discussion, students take five minutes to reflect quietly and write a letter or draw a picture for a friend that demonstrates their understanding of the poem. The children each carry a copy of the poem home to share with their families.

Assessing Growth

The overall purpose of our seminar program was to provide an opportunity for students to explore poetry and discover the richness of shared ideas and experience. The *National Standards for the English Language Arts* provided the foundation for us to develop three categories to guide our assessment of student growth:

1. Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate the mechanics, rhythm, and main ideas of poems.
2. Students are knowledgeable, reflective, creative, and critical members of poetry groups.
3. Students' active participation in poetry groups enhances their comprehension, interpretations, evaluations, and appreciation of poetry.

We developed a five-point scale for each of our three reporting areas. When we compared the pre- and post-assessment scales, student growth exceeded our expectations in all three areas.

Then . . .

Before launching the seminars, we conducted a pre-assessment focus group and preliminary seminar on Emily Dickinson's "I'm Nobody! Who Are You?" (see p. 68) with six students, a representative sample of Hunters Woods kindergarten and 1st grade classes.

In the interview, the students indicated that they had a limited understanding of poetry, ranging from "nothing" to "it rhymes." Only

one student said that she really liked poetry. Even worse, none of the students wanted to know their peers' ideas or opinions.

During the seminar, the students' questions centered on word definitions: "What does *banish* mean?" "What's a *dreary*?" The most sophisticated response was "How public like a frog' doesn't make any sense." Students weren't able to respond to the poem either in writing or by drawing. Reba expressed the group's frustration by saying, "I don't have any pictures in my mind about that poem."

. . . And Now

Flash forward to the conclusion of the pilot, when we reconvened the focus group and repeated the interviews and seminar. Most of the students indicated that now they thought poetry was fun. They knew that although it could rhyme, it did not have to. Two students commented that poets could make up words. One said poets could "zigzag words across the page if they want to." We still had one holdout who did not like poetry, but three thought it was great.

Most impressive was the fact that all of the students now liked to hear other people's ideas. Nashad said, "I like to hear other people's [ideas] because my ideas might be weird and then I understand it better." Emma said, "It's sometimes exciting to hear the other people's ideas."

We told the students that the parents had agreed to continue the poetry groups to the end of the year and asked them to choose an answer that expressed how they felt: either Great, OK, or Why Me? Three said, "Great"; and two said, "OK"; but Benny said, "Why me?" We thanked Benny for sticking with the program even though he hadn't really enjoyed it and told him that he would not have to participate for the last three sessions. His response was immediate—"Change my answer to OK! You can go all the way to great if you have to!" He was an enthusiastic participant for the remaining poetry groups.

In the repeat seminar on the Dickinson poem, the level of questions was richer and more thoughtful than in the earlier session:

“Maybe she feels like a nobody,” said Emma.

Jahar responded, “What’s a nobody anyway?”

“I think a nobody is invisible,” said Lina.

Benny replied, “I’ve felt invisible before.”

“So have I!” echoed Reba and Nashad.

When asked to respond to the poem, students did not hesitate. Four students drew pictures and wrote an explanation of their drawings. One simply drew a picture. Lina wrote this little poem:

Just Me

Just me.

All me.

Why is it

Just me?

“It has to be a little poem,” Lina told us, “because Emily makes me feel like she is very little in her poem. I hope she didn’t always feel that way.”

Begin Young

As we develop new ways to appropriately challenge our littlest learners, it is essential to remember the importance of developing foundational skills in critical and creative thinking. Adopting a dynamic teaching strategy like the Socratic seminar is one way to capitalize on young students’ natural eagerness to question and discuss.

Socratic seminar for kindergartners and 1st graders is alive and flourishing at Hunters Woods Elementary School for the Arts and Sciences. Parents and students requested more lessons to last until the end of the year, and we obliged. What started out as an attempt to provide additional reading enrichment has since become proof of the power in

partnering with parents to strengthen a vision of educational excellence that begins with our youngest learners.

“I’m Nobody! Who Are You?”

I’m nobody! Who are you?

Are you nobody, too?

Then there’s a pair of us—don’t tell!

They’d banish us, you know.

How dreary to be somebody!

How public, like a frog

To tell your name the livelong day

To an admiring bog!

—Emily Dickinson

Source: From Poems by Emily Dickinson, Three series, Complete, by Emily Dickinson, edited by Mabel Loomis Todd & T.W. Higginson, 1896, Boston: Roberts Brothers.

Endnote

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Part 4

Meeting
21st Century
Challenges

Orchestrating the Media Collage

Jason Ohler

Being able to read and write multiple forms of media and integrate them into a meaningful whole is the new hallmark of literacy.

It is no coincidence that the words *letter* and *literacy* look alike. When the concept of a literate person arose centuries ago, it referred to those few who were considered educated, precisely because they “knew the letters.”¹ To this day, the prevailing definition of a literate person is still someone who has the ability to read, write, and understand words.

Yet the word *literacy* rarely appears by itself anymore. Public narrative embraces a number of specialty literacies, including math literacy, research literacy, and even citizenship literacy, to name a few. Understanding the evolving nature of literacy is important because it enables us to understand the emerging nature of illiteracy as well. After all, regardless of the literacy under consideration, the illiterate get left out.

At the epicenter of the evolving nature of literacy is *digital literacy*, the term du jour used to describe the skills, expectations, and perspectives involved in living in a technological society. How has digital literacy evolved in the 25 years since digital tools began appearing in classrooms? And how can we make it more responsive to our present needs?

Writing What You Read

Modern literacy has always meant being able to both read and write narrative in the media forms of the day, whatever they may be. Just being able to read is not sufficient.

For centuries, this has meant being able to consume and produce words through reading and writing and, to a lesser extent, listening and speaking. But the world of digital expression has changed all of this in three respects:

New media demand new literacies. Because of inexpensive, easy-to-use, widely distributed new media tools, being literate now means being able to read and write a number of new media forms, including sound, graphics, and moving images in addition to text.

- *New media coalesce into a collage.* Being literate also means being able to integrate emerging new media forms into a single narrative or “media collage,” such as a Web page, blog, or digital story. That is, students need to be able to use new media collectively as well as individually.
- *New media are largely participatory, social media.* Digital literacy requires that students have command of the media collage within the context of a social Web, often referred to as Web 2.0. The social Web provides venues for individual and collaborative narrative construction and publication through blogs and such services as MySpace, Google Docs, and YouTube. As student participation goes public, the pressure to produce high-quality work increases.

Being able to actively create rather than just passively consume new media is important for the obvious reason that it teaches literacy and job skills that are highly valued in a digital society. But two less obvious reasons are equally important.

First, hands-on media creation plays an important role in the development of *media literacy*, which I define as the ability to recognize,

evaluate, and apply the techniques of media persuasion. The act of creating original media forces students to lift the hood, so to speak, and see media's intricate workings that conspire to do one thing above all others: make the final media product appear smooth, effortless, and natural. "Writing media" compels reflection about reading media, which is crucial in an era in which professional media makers view young people largely in terms of market share.

Second, literacy, as well as citizenship, requires us to be able to navigate the mediascape during a time in history in which the lag time between being able to read particular media and being able to write in those media is shrinking so dramatically. Historically, new media first appear to the vast majority of us in read-only form because they are controlled by a relatively few technicians, developers, and distributors who can understand or afford them. The rest of us only evolve into writers once the new media tools become easy to use, affordable, and widely available, whether these tools are cheap pencils and paper or inexpensive digital tools and shareware.

However, the lag time between being able to read media and being able to write in those media is shrinking quickly for the non-elite. Text took many centuries, audiovisual information took roughly one century, and Web narrative took about 15 years. Thus, a new dimension of literacy is now in play—namely, the ability to adapt to new media forms and fit them into the overall media collage quickly and effectively.

Eight Guidelines for Teachers

A strong case can be made that commanding new media constitutes the current form of general literacy and that adding the modifier *digital* is simply not necessary anymore. Whether or not this is the case, digital literacy warrants a central focus in K–12 learning communities. Eight guidelines can help teachers promote the crucial skills associated with digital literacy.

1. Shift from text centrism to media collage.

General literacy means being able to read and write the media forms of the day, which currently means being able to construct an articulate, meaningful, navigable media collage. The most common media collage is the Web page, but a number of other media constructs also qualify, including videos, digital stories, mashups, stand-and-deliver PowerPoint presentations, and games and virtual environments, to name a few.

As part of their own intellectual retooling in the era of the media collage, teachers can begin by experimenting with a wide range of new media to determine how they best serve their own and their students' educational interests. A simple video can demonstrate a science process; a blog can generate an organic, integrated discussion about a piece of literature; new media in the form of games, documentaries, and digital stories can inform the study of complex social issues; and so on. Thus, a corollary to this guideline is simply, "Experiment fearlessly." Although experts may claim to understand the pedagogical implications of media, the reality is that media are evolving so quickly that teachers should trust their instincts as they explore what works. We are all learning together.

2. Value writing and reading now more than ever.

When we write, we think. We slow down and reflect as we struggle to synthesize, clarify, and communicate. This struggle has always been a part of writing, but it is amplified within the context of the social Web, in which we must also become active readers and editors of one another's materials and mindful contributors to group expression. Effective writing has a new kind of importance for students in what can often be a digitally distracted world.

Those worried about the fate of text in the era of the media collage can rest assured that writing is more important than ever for two other reasons that might not be immediately apparent. First, crafting

text for the Web highlights the importance of written expression by recasting it in a more compact, concise form. Although essays are still of consequence, when we encounter them on a Web page they often appear as walls of text, unscalable to all but the few who are truly inspired by their content. In contrast, effective blog or Web page writing requires using visually differentiated text, which makes onscreen reading easier by using a number of formatting conventions, most notably the 6 *B*s: bullets; boldface; breaks; boxes; beyond black and white (using different font colors); and “beginnings” (providing the first paragraph of a longer piece and a hyperlink to the rest, rather than forcing readers to scroll through what they may consider to be lengthy, irrelevant material).

Both essay writing and blog writing are important, and for that reason, they should support rather than conflict with each other. Essays, such as the one you are reading right now, are suited for detailed argument development, whereas blog writing helps with prioritization, brevity, and clarity. The underlying shift here is one of audience: Only a small portion of readers read essays, whereas a large portion of the public reads Web material. Thus, the pressure is on for students to think and write clearly and precisely if they are to be effective contributors to the collective narrative of the Web.

The second reason that writing is important in the era of the media collage is that it is almost always the pathway to effective media creation. Digital stories, movies, documentaries, and many new media narrative forms require clear, concise, and often highly creative writing as a foundation. The saying, “If it ain’t on the page, then it ain’t on the stage” is just as true today as it was before the digital world arrived.

3. Adopt art as the next R.

I have witnessed more digital art taught by computer-savvy teachers than by art teachers. To understand how dire this situation is, imagine computer technicians rather than language arts instructors

teaching writing because of the former's advanced understanding of word processing technology.

As we consider the shift away from text centrism, it is clear that many of the skills needed to command the new media collage would, by today's school standards, fit best into an art curriculum, where concepts of color, form, and collage are part of the everyday narrative. Unfortunately, art—including music, drama, and the other arts—is largely viewed by K–12 education as, at best, an elective, and at worst, fluff to discard when money gets tight and No Child Left Behind bean counters bring high-stakes testing pressure to bear on school communities. Digital literacy demands that we treat art as the next R, just as important as the traditional 3 Rs. This is one of the most pivotal shifts in literacy that the digital age has inspired, and we should not deny our students these important literacy skills.

4. Blend traditional and emerging literacies.

Our throwaway culture is unrelenting in its desire to make room for the new at the expense of the old. However, a well-rounded approach to the new media collage requires blending a number of literacies, both traditional and emerging, into a cohesive narrative.

Currently, many media collages are based on the four components of “the DAOW of literacy”: Digital, Art, Oral, and Written. Being able to understand and blend the best of the old, recent, and emerging literacies will become a hallmark of the truly literate person.

Of the four components of the DAOW, oracy—the ancient literacy of speaking and listening—deserves much more focus than it currently receives. It is central to many of the media collage forms currently in wide use, including storytelling, narrated documentaries, movies, PowerPoint presentations, and even games and virtual realities. And it is central to leadership as well. After all, we often look for evidence of leadership in the way that people speak to others.

5. Harness report and story.

As new media emerge that must be incorporated into the media collage, the need for metaforms of narrative to bind them together becomes more acute. One kind of metaform can be described by a continuum that is bounded by report on one end and story on the other.

In their most stereotypic forms, reports and stories differ in terms of information structure, use of creativity, and level of audience engagement. Reports are typically linear information presentations that employ little creativity and inspire little emotional engagement, focusing instead on objective research and critical thinking. Stories, on the other hand, use a more creative, nonlinear information construct composed of the elements of tension, transformation, and resolution. The result is that stories engage us and communicate with us in ways that reports do not.

The demands of digital literacy make clear that both research reports and stories represent important approaches to thinking and communicating; students need to be able to understand and use both forms. One of the more exciting pedagogical frontiers that awaits us is learning how to combine the two, blending the critical thinking of the former with the engagement of the latter. The report–story continuum is rich with opportunity to blend research and storytelling in interesting, effective ways within the domain of new media.

6. Practice private and participatory social literacy.

In the mid 1960s, Marshall McLuhan explained that conventional literacy caused us to trade an ear for an eye, and in so doing, trade the social context of the oral tradition for the private point of view of reading and writing. To him, television was the first step in our “retribalization,” providing a common social experience that could serve as the basis for dialogue in the global village.²

However, television told someone *else’s* story, not ours. It was not until Web 2.0 that we had the tools to come full circle and produce

and consume social narrative in equal measure. Much of the emerging nature of literacy is a result of inexpensive, widely available, flexible Web 2.0 tools that enable anyone, regardless of technical skill, to play some part in reinventing literacy.

The new media collage depends on a combination of individual and collective thinking and creative endeavor. It requires all of us to express ourselves clearly as individuals, while merging our expression into the domain of public narrative. This can include everything from expecting students to craft a collaborative media collage project in language arts classes to requiring them to contribute to international wikis and collective research projects about global warming with colleagues they have never seen. What is key here is that these are now “normal” kinds of expression that carry over into the world of work and creative personal expression beyond school.

7. Develop literacy with digital tools and about digital tools.

In practical terms, access to citizenship is largely a function of literacy. This is not a new concept. Jefferson wrote copiously about the need for an educated and literate public if democracy was to succeed. What is new is that the tools of literacy, as well as their effects, are now a topic of literacy itself.

Students need to be media literate to understand how media technique influences perception and thinking. They also need to understand larger social issues that are inextricably linked to digital citizenship, such as security, environmental degradation, digital equity, and living in a multicultural, networked world. We want our students to use technology not only effectively and creatively, but also wisely, to be concerned with not just *how* to use digital tools, but also when to use them and why.

Topics such as the environmental effects of living a technology-enhanced lifestyle and the social costs of the digital divide provide important subject matter for project-based learning that involves

science, social studies, and other curriculum areas. Having students research the personal, local, and global implications of these issues will help them place technology within the larger perspective of community and reevaluate their idea of what it means to be successful. Having them address these issues in school will show them that the goal of education is to produce not only capable workers, but also caring, involved, and informed neighbors and citizens.

8. Pursue fluency.

During the industrial age, the desire for literacy for the masses was for basic literacy—just enough to enable most people to operate the machines that the fluent few designed and developed. But in an era in which literally anyone with a laptop and an Internet connection can be a well-educated entrepreneur, we need to look beyond general literacy to fluency.

Fluency is the ability to practice literacy at the advanced levels required for sophisticated communication within social and workplace environments. Digital fluency facilitates the language of leadership and innovation that enables us to translate our ideas into compelling professional practice. The fluent will lead, the literate will follow, and the rest will get left behind.

Digital fluency is much more of a perspective than a technical skill set. Teachers who are truly digitally fluent will blend creativity and innovation into lesson plans, assignments, and projects and understand the role that digital tools can play in creating academic expectations that are authentically connected, both locally and globally, to their students' lives.

Teachers as Guides

Although some teachers are genuinely excited about the emerging nature of literacy brought about by powerful digital tools, others feel

overwhelmed—some to the point where they are prompted to leave the profession. It is my fervent hope that they don't leave. Their students need them.

Teachers don't have to be advanced technicians. Their students tend to be fearless adopters of new technology who have the luxury of time and well-developed informal learning communities to keep up on the latest and greatest happenings in the world of technology. What *is* important is that teachers become advanced managers of their students' talents, time, and productivity. Teachers need to be able to articulate standards of quality and provide feedback that students can use to meet those standards. They need to be the guide on the side rather than the technician magician.

Now more than ever, students living in the overwhelming and often distracting world of technical possibility need the clear voice of a teacher who can help them develop literacies that will be important to them for a lifetime. Now more than ever, students need teachers who can help them sort through choices, apply technology wisely, and tell their stories clearly and with humanity.

My advice to teachers concerned with digital literacy? Focus on expression first and technology second—and everything will fall into place.

Endnotes

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The Window into Green

Mike Weilbacher

With the new wave of interest in the environment, will we finally give students the tools they need to become environmentally literate citizens?

In just a few weeks, high school seniors all around the United States will walk proudly across stages, hoisting their diplomas as they graduate from formal K–12 education. As their teachers, we'll look on with some wistfulness, for the world into which they are graduating—one of spiraling financial crises coupled with huge international challenges—is vastly different from the one in which they started their senior year only 10 months ago.

But wait, it gets worse. If you place your finger on the pulse of the planet, this is what you'll discover: global surface temperatures rising, glaciers melting, oceans warming, sea levels rising, rain forests burning, coral reefs dying, old-growth forests disappearing, deserts spreading, the world's population increasing, and species vanishing at the highest rates since the extinction of the dinosaurs.

In short, the ecology that underpins our economy is also collapsing. And the solutions to *this* challenge elude not only most of our graduates, but also us—their teachers, administrators, and parents.

Will our graduates be ready for these new realities? Will they confidently stride into this world as college students, workers, voters, consumers—in short, as competent, caring adults capable of making good decisions on the pressing issues of the day?

Environmental Ignorance

Forty years ago, in the first issue of the *Journal of Environmental Education*, William B. Stapp (1969) defined the goal of the nascent field of environmental education as producing a citizenry that “is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution” (p. 30).

Today, a new U.S. president actively seeks approval from the American people for repairing the economic collapse while preventing the ecological one. There will be fierce pressure on President Obama to forgo environmental projects in lieu of economic ones. Have the past 40 years of environmental education met Stapp’s challenge and created the environmentally literate citizenry we need to negotiate the coming trade-offs?

In a word, no.

A typical high school student is aware of environmental issues, has discussed and debated climate change or rain forest loss in some class sometime, and might have bumper-sticker answers to lapel-pin questions. But do our students know where the trash goes when it leaves their house? The leading source of greenhouse gas emissions? Why we recycle? (Glass and aluminum, after all, are not rare resources.) If you ask a group of students what we can do to combat the warming trend, several will chime in that we need to remove chlorofluorocarbons (CFCs) from hair spray. (Many high schoolers conflate global warming with ozone depletion and haven’t been told that CFCs were removed from the market 20 years ago.)

My organization surveyed high school students on these questions and more and discovered that although students are overwhelmingly “pro-environment,” they possess remarkably little information about breaking environmental issues. One small example: We asked them to name one bird they can identify by song. The leading answer? None. If local birds disappear from the landscape because of extinction, or

arrive three weeks late because of warming climates, it's possible that no one will notice.

Oh, there are numerous bright spots in the environmental education movement, but progress is hardly keeping up with the increasingly urgent issues that face us today. When Stapp coined his definition four decades ago, the United States was riding a wave of interest in the environment triggered by the Santa Barbara oil spill, Ohio's Cuyahoga River catching fire, Lake Erie being declared biologically dead, and charismatic birds like eagles and peregrine falcons vanishing. As we addressed these issues, the wave crested, and interest in ecology quickly ebbed.

Today, even though an interest in green ideas is resurging, the issues are far more global, complex, and intertwined with politics. Atmospheric carbon dioxide levels currently exceed 385 parts per million, almost 40 percent higher than pre-Industrial Revolution levels, and they are rising every year. Consequently, the Arctic Ocean is changing dramatically as the Arctic warms more quickly than anyone expected, and our graduates may see an ice-free polar cap in the summer in their lifetimes.

An International Union for the Conservation of Nature report (2008) noted that one in four of the world's mammals are at risk of extinction from habitat loss, poaching, and climate change. Many critically important rivers—such as the Nile, the Yellow, and the Colorado—no longer empty water into the sea. Mountains of discarded cell phones and computers make their way to destitute Chinese villages, where they are picked apart for valuable metals, exposing the villagers to high concentrations of incredibly toxic materials.

To address today's geopolitically entangled world of large, complex eco-issues, students simply have to know more than they did 40 years ago.

What's the Problem?

Four issues have become huge obstacles to environmental literacy. First, students are extraordinarily disconnected from the environment. Richard Louv's revelatory 2005 book *Last Child in the Woods* called attention to a world of children rapidly retreating from outdoor play and time spent in nature. Instead, modern kids stay indoors, "cause that's where all the electrical outlets are," as one 4th grader famously said (p. 10).

Viewing screens has become a child's full-time job. Kids are plugged in 24/7, watching an average of 25 hours of TV a week (Gentile & Walsh, 2002) and then logging additional screen time on the Internet, browsing the Web, playing video games, and engaging in whole new verbs, like IMing and Facebooking. Louv coined the phrase *nature-deficit disorder* to describe the "human costs of alienation from nature" (p. 34), including diminished use of the senses, attention difficulties, and higher rates of physical and emotional illness. Just when students need contact with nature more than ever, they have abandoned it.

Second, ask any environmental educator and he or she will bemoan No Child Left Behind, whose pressures have caused many schools to trade outdoor field trips for test prep. Science teachers routinely eliminate such concepts as environmental education, which do not appear to relate directly to questions on the tests. The Chesapeake Bay Foundation's Web site (2009) bluntly states, "No Child Left Behind is contributing to an increasing environmental literacy gap by reducing the amount of environmental education taking place in K-12 classrooms."

Third, students' exposure to environmental education depends on the luck of the draw and the amalgam of the interests of whichever teachers they happen to have throughout their school career. In my daughters' school, there were two 5th grade teachers, one contagiously obsessed with birds and birdwatching and the other in love with Broadway musicals. One class went on an all-day birding trip; the other

performed a play for the entire school. Both are equally interesting and important activities, but why didn't the two cross-pollinate and give all 5th graders equal access to both? My daughters caught the birding bug, but one-half of the 5th grade never saw a nesting piping plover.

And finally, the downside of the large nonprofit universe of environmental education facilities—zoos, museums, aquariums, nature centers, parks, arboretums, children's gardens—is that schools approach environmental education like a Chinese menu. They pick a field trip from column A and a lesson plan from column B; toss in an occasional Earth Day assembly, litter pickup, and letter to the president; and assume that their charges are now environmentally literate. And the nonprofits, wanting students to return the following year, emphasize fun over content, immersing the students in activity-based education that is designed to serve as an appetizer for environmental literacy but ends up becoming the main course. They often retreat from tough concepts like water shortages and stay with politically lighter ones like the water cycle.

The upshot? Even though there are more centers for environmental education and more college degree programs in environment-related fields than ever, and even though building green schools has suddenly emerged as an important idea (pre-economic meltdown), we are perhaps even farther from environmental literacy than we were in 1969.

Students are graduating from our schools thinking that green is good. But we haven't given them the tools they need to become environmentally literate citizens.

New Research May Turn the Tide

Fortunately, several important research efforts are threading their way through the education system. For example, the Children and Nature Network, a Web-based organization (www.childrenandnature.org) that reports a wide variety of data and activities related to repairing the nature deficit disorder, showcases data illuminating the educational

benefits of immersing students in the outdoors and environmental education experiences. And there's tons of data.

The American Institutes for Research (2005) studied the effects of weeklong residential outdoor education programs in which most of the participants were at-risk youth. Comparing students who experienced the outdoor education program with those in a control group who had not had the experience, the researchers found a 27 percent increase in measured mastery of science concepts, plus enhanced cooperation and conflict-resolution skills, higher self-esteem, and gains in problem solving, motivation, and classroom behavior.

A Canadian study found that children whose school grounds include diverse natural settings are more physically active, more aware of nutrition, more civil to one another, and more creative (Bell & Dymont, 2006). Another study discovered that children playing in green settings have reduced symptoms of attention deficit disorder (Taylor, Kuo, & Sullivan, 2001).

The more studies are published, the more they agree: Exposure to nature raises test scores; increases creativity, cooperation, and self-confidence; reduces stress; and enhances cognitive abilities.

Promising Models

When the next wave of environmental interest washes over our schools, as it inevitably will, this body of research will support the new ideas for truly fulfilling Stapp's dream of environmental literacy. Here are a few intriguing efforts now underway.

No Child Left Inside

In response to Louv's book, more than 1,000 nonprofits with almost 50 million members have launched a variety of efforts loosely organized under the title "No Child Left Inside." For instance, the National Audubon Society has pledged to place a family-oriented nature

center in every congressional district. Connecticut governor M. Jodi Rell launched a special Web site (www.nochildleftinside.org) promoting state parks, an idea copied by many other states. And the U.S. Congress has considered a No Child Left Inside act that would provide federal funding for environmental literacy plans and for state efforts to train teachers in model environmental education programming, including outdoor learning. In the last session, the act passed the House, and supporters are eager to try again in the new Congress.

Green Charter Schools

For better or worse, the charter school movement has been sweeping across the United States in the last decade. A growing number of charter schools have been designed around the simple premise that the entire science curriculum can be taught through environmental education.

The Green Woods Charter School in Philadelphia is located on the campus of the Schuylkill Center for Environmental Education, a 340-acre living laboratory of forests and fields, streams and ponds. The center's naturalists are integrated into the science faculty of the school, and the students spend quality time immersed in the woods.

Wisconsin's River Crossing Environmental Charter School, located in a one-room schoolhouse, provides a hands-on curriculum with subjects integrated through environmental studies. Students in 7th and 8th grade participate weekly in field trips and real-world ecosystem restoration projects, such as restoring the prairie and building rain gardens for storm water.

Other sites include California's Environmental Charter High School, Connecticut's Common Ground High School, and Florida's Academy of Environmental Sciences. A Green Charter Schools Network (www.greencharterschools.org) has formed to assist teachers and staff. Sadly, precious few students are fortunate enough to attend these schools.

Environment as an Integrating Context for Learning

Another innovation that has grown in popularity in the last decade is the Environment as an Integrating Context for Learning movement, a cumbersome name for a simple concept. In place of the rigorously scheduled school day of science, English, and gym periods, these programs use the environment and the outdoors as the centerpiece of students' curriculum. This format breaks down barriers between disciplines, stresses team building and individualized learning, and involves students in real-world community issues.

In suburban Philadelphia, for example, the pioneering Watershed program at Radnor Middle School engages students in outdoor field studies all year, including stream testing, canoeing, trout rearing and release, and more. Students in the program spend all day together, except for math and foreign language classes, in which they are integrated with the rest of the school. Students hone their communication skills at conferences and youth summits.

One analysis of 40 Environment as an Integrating Context for Learning programs (Lieberman & Hoody, 1998) discovered that students in these programs outscored their peers on standardized tests, had better grades, and acted more independently and responsibly. At one school using this approach, reports to the principal's office declined 91 percent in the three-year study period.

Wood Kindergartens

A rather radical movement has leapt across the pond from Europe and, coupled with Richard Louv's work, has begun making inroads in the United States. In the Wood School model, child care workers and youngsters ages 3–6 spend the entire day outdoors in nature. The program is held outdoors in all seasons, although the group moves indoors in extreme weather. Proponents of this process assert that

playing outside for prolonged periods strengthens the students' immune systems and improves development of manual dexterity, physical coordination, tactile sensitivity, and depth perception.

Here in the United States, many nature centers, such as the Chippewa Nature Center in Midland, Michigan, have begun opening variants of Wood Kindergartens, versions that might not strictly adhere to the Europeans' outdoor component but still allow the students full and frequent access to natural areas and nature-based play (Reynolds, 2007).

Greening of the Culture

U.S. schools teach what American culture considers important. Once society decided that computer literacy was central to a solid education, computer classes invaded schools at warp speed, and the "digital divide" became an important and contentious issue.

As environmental issues heat up (pardon the pun), the culture is coming to consensus—again—on the importance of the environment. Green cable channels, green Web sites, eco-chic clothing, green roofs on green buildings, and innumerable products made from recycled objects are beginning to infuse the culture with a newfound interest in sustainability—an interest that ideally will create a ground swell of support for environmental improvement.

But the four horsemen of the global apocalypse—warming, species loss, water scarcity, and population growth—are bearing down on us, and many environmentalists worry about a vanishing window of opportunity for addressing these issues. Science fiction writer H. G. Wells was prophetic when he wrote in 1920 that "human history becomes more and more a race between education and catastrophe."

Environmental literacy is one race that education must win.

What Every Student Should Know About the Environment

There are scores of possible models of environmental education programs, and most have many of the following large concepts in common. As students go from kindergarten through high school, they can work their way down the list.

1. Earth overflows with life.

One of science's biggest mysteries is how many species share this planet— estimates range from 5 million to 100 million species. Many environmental education programs begin with the premise that life is vanishing; young learners should first know that Earth teems with a huge number of creatures.

2. Each creature is uniquely adapted to its environment.

Every species evolved to possess a unique set of adaptations that enables it to survive and thrive in its ecosystem. Students should be on a first-name basis with many local creatures.

3. The web of life is interdependent.

Organisms evolve complex relationships, each depending on numerous other species for their survival.

4. Materials flow through ecosystems in cycles.

All creatures need water, air, and nutrients to survive. These materials cycle and recycle through ecosystems. The water we drink today is the same water we've always had, and always will.

5. The sun is the ultimate source of energy flowing through ecosystems.

Food grows from sunlight energy; our houses are heated by fossil fuels created many millennia ago from ancient sunlight.

6. There is no waste in nature; everything is recycled.

In nature, every waste product is used by other creatures. Humans have bent those circles into straight lines, where things are used once and tossed.

7. We consume resources to live.

Every student should know where the trash truck takes the trash, where water comes from, and how the nearest power plant makes electricity.

8. Conservation is the wise use of finite resources.

We are physical creatures with real needs—to eat, drink, build houses, write on paper. But how do we use these resources sustainably?

9. Humans can have a profound effect on environmental systems.

Fossil fuels pump carbon dioxide into the sky; habitat loss is causing the extinction of large numbers of species. Our actions profoundly affect the ecological systems that sustain living things—and us. Nature can often repair these systems (forests grow back, for example); but humans are changing systems faster than nature can adapt.

10. Each of us can powerfully affect the fate of the natural world.

Because each of us is directly plugged into the planet, the actions we take—or fail to take—profoundly influence earth's systems.

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Becoming Citizens of the World

Vivien Stewart

*The future is here. It's multiethnic, multicultural, and multilingual.
But are students ready for it?*

The world into which today's high school students will graduate is fundamentally different from the one in which many of us grew up. We're increasingly living in a globalized society that has a whole new set of challenges. Four trends have brought us here.

The first trend is economic. The globalization of economies and the rise of Asia are central facts of the early 21st century. Since 1990, 3 billion people in China, India, and the former Soviet Union have moved from closed economies into a global one. The economies of China, India, and Japan, which represented 18 percent of the world's gross domestic product (GDP) in 2004, are expected to represent 50 percent of the world's GDP within 30 years (Wilson, 2005). One in five U.S. jobs is now tied to international trade, a proportion that will continue to increase (U.S. Census Bureau, 2004). Moreover, most U.S. companies expect the majority of their growth to be in overseas markets, which means they will increasingly require a workforce with international competence. According to the Committee for Economic Development (2006),

To compete successfully in the global marketplace, both U.S.-based multinational corporations as well as small businesses increasingly need employees with knowledge of foreign languages and cultures to market products to customers around

the globe and to work effectively with foreign employees and partners in other countries.

Science and technology are changing the world and represent a second trend. In *The World Is Flat*, Thomas Friedman (2005) describes how the “wiring of the world” and the digitization of production since 1998 are making it possible for people to do increasing amounts of work anywhere and anytime. Global production teams are becoming commonplace in business. In addition, scientific research, a key driver of innovation, will increasingly be conducted by international teams as other countries ramp-up their scientific capacity.

The third trend involves health and security matters. Every major issue that people face—from environmental degradation and global warming, to pandemic diseases, to energy and water shortages, to terrorism and weapons proliferation—has an international dimension. Solving these problems will require international cooperation among governments, professional organizations, and corporations. Also, as the line between domestic and international affairs blurs, U.S. citizens will increasingly vote and act on issues—such as alternative energy sources or security measures linked to terrorism—that require a greater knowledge of the world. In response to this need, a 2006 report from the National Association of State Boards of Education recommends infusing classroom instruction with a strong global perspective and incorporating discussions of current local, national, and international issues and events.

The fourth trend is changing demographics. Globalization has accelerated international migration. New immigrants from such regions as Asia and Central and South America are generating a diversity in U.S. communities that mirrors the diversity of the world. Knowledge of other cultures will help students understand and respect classmates from different countries and will promote effective leadership abroad.

In short, U.S. high school graduates will

- Sell to the world.
- Buy from the world.
- Work for international companies.
- Manage employees from other cultures and countries.
- Collaborate with people all over the world in joint ventures.
- Compete with people on the other side of the world for jobs and markets.
- Tackle global problems, such as AIDS, avian flu, pollution, and disaster recovery (Center for International Understanding, 2005).

However, U.S. schools are not adequately preparing students for these challenges. Surveys conducted by the Asia Society (2002) and National Geographic-Roper (2002) indicated that, compared with students in nine other industrialized countries, U.S. students lack knowledge of world geography, history, and current events. And shockingly few U.S. students learn languages that large numbers of people speak, such as Chinese (1.3 billion speakers) and Arabic (246 million speakers).

Many countries in Europe and Asia are preparing their students for the global age by raising their levels of education attainment; emphasizing international knowledge, skills, and language acquisition; and fostering respect for other cultures. The United States must create its own education response to globalization, which should include raising standards, increasing high school and college graduation rates, and modernizing and internationalizing the curriculum.

What Global Competence Looks Like

The new skill set that students will need goes well beyond the United States' current focus on the basics and on math, science, and technology. These skills are necessary, of course, but to be successful global citizens, workers, and leaders, students will need to be knowledgeable about the

world, be able to communicate in languages other than English, and be informed and active citizens.

World Knowledge

Teaching about the rest of the world in U.S. schools has often focused on the superficial: food, fun, and festivals. Today, we need deeper knowledge, such as understanding significant global trends in science and technology, how regions and cultures have developed and how they interconnect, and how international trade and the global economy work. For example, students might consider how increasing the supply of fresh water or changing forms of energy use in one country could have major effects on another country.

In a world in which knowledge is changing rapidly and technology is providing access to vast amounts of information, our challenge is not merely to give students more facts about geography, customs, or particular conflicts. Rather, our challenge is to hone students' critical-thinking skills and to familiarize students with key concepts that they can apply to new situations. In this way, they can make sense of the explosion of information from different sources around the world and put factual information into perspective and context. Only then can this information become meaningful.

Teaching students about the world is not a subject in itself, separate from other content areas, but should be an integral part of *all* subjects taught. We need to open global gateways and inspire students to explore beyond their national borders. Programs like iLEARN and Global Learning and Observations to Benefit the Environment (GLOBE) make it possible for students to work collaboratively with peers in other countries. School-to-school partnerships enable both real and virtual exchanges.

U.S. students are global teenagers, similar in many ways to their technology-enabled peers around the world. Adding an international dimension to subjects and encouraging students to reach out to peers

in other countries are powerful ways to make the curriculum relevant and engaging to today's youth.

Language Skills

Only about one-half of U.S. high school students study a foreign language. The majority never go beyond the introductory level, and 70 percent study Spanish (Draper & Hicks, 2002). This results in a serious lack of capacity in such languages as Arabic and Chinese, both of which are crucial to the prosperity and security of the United States.

The United States should do as other industrialized countries in Europe and Asia do—start offering foreign languages in the elementary grades, where research has shown that language learning is most effective (Pufahl, Rhodes, & Christian, 2001), and continue the emphasis in secondary school to create pipelines of proficient language speakers. U.S. students need opportunities to learn a broader range of languages, as in Australia, where 25 percent of students now learn an Asian language (Asia Society, 2002). Heritage communities in the United States—communities in which a non-English language is spoken at home, such as Spanish or Navajo—provide rich sources of teachers, students, and cultural experiences (National Language Conference, 2005). Specific practices, such as immersion experiences, can greatly enhance language proficiency.

The growing interest in learning Chinese, as shown by the fact that 2,400 U.S. high schools expressed interest in offering the new advanced placement course in Mandarin, suggests that parents and teachers are realizing the importance of communication skills in a multilingual, multicultural world (see www.AskAsia.org/Chinese). Even if graduates don't use a second language at work, quite possibly they will work in cross-cultural teams and environments.

Civic Values

U.S. students need to extend traditional American values into the global arena. These include a concern for human rights and respect for cultures that differ from the United States. By learning to understand other perspectives, students can develop critical-thinking skills and enhance their creativity.

Students should focus on becoming active and engaged citizens in both their local and global environments. Schools can promote civic engagement by weaving discussions of current events throughout the school day and through participatory forms of education, such as Model UN or the Capitol Forum on America's Future, in which high school students voice their opinions on current international issues. Schools should use technology to connect students directly to peers in other parts of the world and promote service learning projects on issues that students can address at both the local and international levels, such as alleviating hunger, providing education support to students in poverty, and improving the environment.

What Schools Can Do

Across the United States, many schools already define their mission as producing students who are prepared for work, citizenship, and leadership in the global era. These schools have found that internationalizing the curriculum creates a more exciting environment for students and teachers alike (Bell-Rose & Desai, 2005). Several approaches have proven successful.

Introducing an international studies requirement for graduation. More than a decade ago, the school board of Evanston Township, Illinois, introduced an international studies requirement for graduation and asked the high school's teachers to develop the necessary courses. Now, every sophomore in this diverse Chicago suburb must complete

the one-year international studies requirement. Students choose from a series of in-depth humanities courses on the history, literature, and art of Asia, Africa, Latin America, and the Middle East. Simulations and participatory projects are central to instruction, and partnerships with local universities ensure that teachers have ongoing professional development in international affairs.

Creating an elementary school immersion program. After surveying parents and local businesses about the future needs of the community—they cited skills in English, Spanish, and Japanese as important—Seattle public schools created the John Stanford International School, a public elementary bilingual immersion school. Students spend half the day studying math, science, culture, and literacy in either Japanese or Spanish; they spend the other half of the day learning reading, writing, and social studies in English. The school also offers English as a second language courses for immigrant students and after-school courses for their parents. As a result of the school's success, the city of Seattle has recently decided to open 10 more internationally oriented schools.

Developing international schools-within-schools. The Eugene International High School is a school-within-a-school on four high school campuses in Eugene, Oregon. The school is open to all interested students. The four-year sequence of courses centers thematically on culture, history, and the political, economic, and belief systems of different world regions, such as Asia, Africa, the Middle East, and Latin America. The school also emphasizes independent research courses to give students the tools to address global issues. An extended essay and a community-service requirement in 11th and 12th grade both have an international focus. For example, one student wrote a 4,000-word research essay on hydrogen cars and their place in the world economy. Students volunteer at such places as Centro Latino Americano, University of Oregon International Education and Exchange, and Holt International Children's Services. Finally, students have the option of pursuing the International Baccalaureate.

Teaching crucial language skills to prepare for the global economy. With strong support from Mayor Richard M. Daley, whose goal is to make Chicago a hub for international trade, the city has created the largest Chinese-language program in the United States. Twenty public schools teach Mandarin, from an all-black school on the West Side to a nearly all-Hispanic school on the South Side to more diverse schools throughout the city. For many of these students, Chinese is their third language after English and Spanish. The program resulted from partnerships among political, business, school, and community leaders and the Chinese Ministry of Education, which provides Chinese teachers and organizes a summer cultural program for Chicago educators in China.

Redesigning urban secondary schools with an international focus. Using the International High School of the Americas in San Antonio, Texas, and the Metropolitan Learning Center in Hartford, Connecticut, as anchor schools, the Asia Society has created a network of small, internationally themed secondary schools across the United States (www.asiasociety.org). The mission of each school is to prepare low-income students for college and to promote their knowledge of world regions and international issues. Each public or charter school incorporates international content across the curriculum, offers both Asian and European languages, provides international exchange opportunities, and provides links to international organizations and community-service opportunities. To date, 10 schools have opened in New York City; Los Angeles; Charlotte, North Carolina; Denver, Colorado; and Houston, Texas. Additional schools are slated to open in other locations, such as Mathis and Austin, Texas, and Philadelphia, Pennsylvania.

Using student-faculty exchanges to promote curriculum change. Two public high schools in Newton, Massachusetts—Newton North and Newton South—run an exchange program with the Jingshan School in Beijing, China. Created by two teachers in 1979, the exchange enables U.S. and Chinese teachers and students to spend time in one another's schools every year. The program has served as a catalyst for

districtwide curriculum change, bringing the study of Asian cultures into various academic disciplines, from social studies to science, and adding Chinese to the district's broad array of language options. The leaders of this exchange now help schools around the United States develop exchange programs with China as a way to internationalize their curriculums.

Using a K–12 foreign language sequence to promote excellence. The Glastonbury School District in Connecticut has long promoted language study, beginning with a K–8 language requirement. Ninety-three percent of students study at least one foreign language, and 30 percent study more than one. The foreign language curriculum is thematic and interdisciplinary, integrating both foreign language and world history standards. All high school students take a one-semester history course on a non-Western geographic/cultural region and a civics/current issues course that includes international content. The school district's reputation for languages and international studies is a major draw for families moving to the area.

These and other pioneering schools offer models that all schools can replicate. What are the lessons learned? Have a large vision of what you want to achieve, but start slowly, one course or grade level at a time. Involve parents as well as business and community leaders in planning and supporting international education and world languages. Focus on professional development for teachers, including partnerships with local colleges, so teachers can broaden and deepen their international knowledge. Include a focus on mastery of languages, including nontraditional languages, and start at the lowest grade levels possible. Use international exchanges, both real and virtual, to enable students to gain firsthand knowledge of the culture they are studying. If it is unfeasible for students to travel, try technology-based alternatives, such as classroom-to-classroom linkages, global science projects, and videoconferences (Sachar, 2004).

What Policymakers Can Do

Recognizing that future economic development and jobs in their states will be linked to success in the global economy, many states are developing innovations to promote international knowledge and skills. Nineteen states have been working together through the Asia Society's States Network on International Education in the Schools. States have developed commissions (North Carolina, Vermont); statewide summits (Delaware, Indiana, Massachusetts, Washington); and reports to assess the status of international education in their state (North Carolina, New Jersey, Wisconsin, West Virginia). They have created mechanisms, such as International or Global Education Councils (Ohio, Indiana, Wisconsin), and appointed International Education Coordinators to develop new policies and action plans (Delaware, Indiana, Ohio, New Jersey, Wisconsin). They are revising standards (Delaware, Idaho) or high school graduation requirements (New Mexico, Virginia) to incorporate international content. Some states are offering professional development (Oklahoma); initiating new language programs (Connecticut, Delaware, Illinois, Minnesota, Wisconsin, Wyoming); engaging in school exchanges with China (Connecticut, Massachusetts); adding crucial foreign language courses to their virtual high schools (Kentucky); and adding an international dimension to science, technology, engineering, and math (STEM) schools (Ohio, Texas). Finally, some (Arizona, Massachusetts, North Carolina, Washington) have introduced state legislation to provide additional funds to incorporate a global dimension into their schools (see <http://Internationaled.org/states>).

In 2006, the National Governors Association held a session on International Education at its annual meeting. In addition, the Council of Chief State School Officers recently adopted a new policy statement on global education (2007). These state efforts are a good start, but the United States has yet to make international knowledge and skills a policy priority on the federal level and develop the systems and

supports necessary to get high-quality international content into U.S. classrooms.

States need to pursue four policy goals to make this happen. They should

- Redesign high schools and create new graduation requirements to motivate higher achievement and promote important international knowledge and key skills.
- Expand teacher training to deliver rigorous study in world history and cultures, economics, world regions, and global challenges.
- Develop world language pipelines from primary school to college that focus on crucial languages, such as Chinese, and that address the acute shortage of language teachers.
- Use technology in innovative ways to expand the availability of international courses and ensure that every school in the United States has an ongoing virtual link to schools in other countries.

For almost 50 years, the U.S. government has played a crucial role in fostering foreign languages and international education in *higher* education. We need to extend this commitment to K–12 education and make it an urgent priority. By doing so, we can improve students' international knowledge and skills and increase both the competitive edge and security of the United States.

In his 2006 report, *The Economics of Knowledge: Why Education Is Key for Europe's Success*, Andreas Schleicher from the Organisation for Economic Cooperation and Development wrote,

The world is indifferent to tradition and past reputations, unforgiving of frailty and ignorant of custom or practice. Success will go to those individuals and countries which are swift to adapt, slow to complain, and open to change.

Part of the great strength of the United States is its adaptability. U.S. schools adapted to the agrarian age, then to the industrial age. It's time to open to change once more and adapt to the global age.

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Stirring Up Justice

Laurel Schmidt

When we embrace social justice as a pillar of learning in our classrooms, we declare that we're all responsible for improving our world.

In an era of homogenized, shrink-wrapped, germ-free curriculum, social justice is the renegade. It doesn't just push the envelope—it's several leagues outside the box. For a start, it has few right answers. Study geography, and you know you're dealing with topography and climate. Even history has some solid content among the questions and interpretations. But social justice is amorphous. It's an unscripted mixture of politics, economics, laws, values, humanitarian crises, and issues that pit common sense against the common good.

For every earnest cause, dozens of well-educated and well-funded countervailing voices explain why the situation can't or shouldn't change. So you and your students must grapple with this question: Are there some behaviors or conditions that we simply must address, no matter how difficult or unpopular our work will be?

There's so much to do, even in our own neighborhoods. Some projects are simple fixes, but many turn out to be a tiny first link in a long, arduous chain of effort. Think of the thousands of discrete actions required over the decades to achieve civil rights for minorities in the United States. So your students may never have the thrill of seeing a bill signed into law, a shelter renovated, or even a municipal code modified to create a publicly funded meals program for homeless people. They may solve one part of a problem, only to discover that they've

uncovered a greater injustice or need. Social activists face disappointment and frustration every day, but they keep on trying.

Social activism is also potentially dangerous. A veteran educator explained how one of his students warned him, “You know, Mr. Kohl, you could get arrested for stirring up justice!” You have only to look at the history of the civil rights movement to know how right he was.

So social justice is untidy, exhausting, discouraging, even dangerous work—which may be the reason why it’s not on the top ten list of social studies projects in many schools. Better to have kids build a model of a *rancho* (a group of huts for housing ranch workers) or recreate a *potlatch* (a festival ceremony practiced by the indigenous peoples of the Pacific Northwest) and be done with it.

From Idea to Action

But whether you ignore or embrace the topic, the truth is that most students experience or think about social justice issues. They know instinctively when something’s unfair, whether they’re puzzled by the way certain kids are excluded from playground games or worried about where homeless people sleep at night. Kids rarely accept injustice as the status quo. Instead, they look to the adults in their lives—parents, teachers, coaches, and relatives—to help them decide what to do.

In the best-case scenarios, the adults encourage rather than avoid authentic conversations about our collective dilemmas—human rights, environmental protection, economic justice, violence. They embrace the inevitable question, What can we do about it? and teach students to act.

But sometimes the response from adults is less than inspiring. We squirm, change the subject, turn a blind eye. *Drop it* is the unspoken message. Children may well respond to the discovery that the topic of social justice is off limits by thinking that

- Injustice is a fact of life; there's no point in trying to change human nature.
- Injustice is unfortunate, but getting involved is too discouraging.
- Perhaps the victims brought it on themselves. They deserve it.

Even if kids never get that far in their thinking, they may be left with a vague uneasiness that if *they* were ever in dire straits, no one would come to their rescue.

Younger students may not be able to define social justice, but they can list the attributes that we value in human relationships: friendship, responsibility, equality, fairness, mutual support, collaboration, and caring. With a little prompting, older students enlarge their sphere of concern, zeroing in on injustice related to socioeconomic status, exploitation, and the abuses of power. They probably won't use those words, but they'll recognize the issues.

They'll notice for example, that certain ethnicities seem to be overrepresented on the homeless rolls in their own town and underrepresented in the local power structure or that hotel workers risk their jobs to demonstrate for a living wage, but the subject is aggressively ignored at city council meetings. And now that classrooms have Internet access, it won't take long for students to discover sweatshops, child labor, hazardous waste, discrimination, and the devastation of the natural environment on a global scale.

Learning about all these injustices would be emotionally daunting for kids if it were just an exercise in cataloguing calamities and human indifference. But social justice education encourages students to *act*. It is based on the notion that we, the people, agree to live by a covenant that defines how we will behave toward one another in a community, whether you define community as a prairie town or the planet. If individuals, town leaders, or federal officials violate the covenant, then we attempt to restore justice through concerted action.

But kids can't do this alone. They need adult mentors to help them translate their ideas into action. With guidance, they can go from passive spectators to activists, focusing their energy on solutions that could save an ecosystem, a species, or a life. They eagerly master new skills, contact key people, and gather crucial resources—because something real and terribly important hangs in the balance.

The Social Action Autobiography

Most of us become social activists through inspiration. We meet or read about someone who puts everything on the line for a cause, and we're moved—or deeply disturbed—by the realization that we, too, possess the power to make a difference.

Some kids have already had that epiphany, even on a micro-scale, but they may not see themselves as activists yet. That's your starting point. When you decide to include social justice projects in your curriculum, you need to take the all-important first step of finding out what your students already know and what experience they've had in trying to solve problems in the community.

The social action autobiography helps all students recognize the ways they've acted for the good of others. Giving them the opportunity to share their prior knowledge lets them feel smart from the outset and enables you to gather valuable details about their individual skills and interests. For younger students, the prompt might be something like, *Think of a time when you helped someone.* This could range from taking care of a neighbor's cat to playing with a child who had no friends. The students can respond by writing, drawing a picture, or making an annotated drawing with images and words. Even kindergartners can do this reflective activity by drawing a picture or series of pictures and then dictating to a scribe, perhaps an older student, parent, instructional aide, or the teacher. If you can't arrange for scribes, ask the students to discuss their pictures in small groups.

Ask older students to think about a problem that involved other people, the community, the environment, or animals, and what they did to help. You can pose a series of questions like the following to help them remember details and analyze their actions:

- How did you find out about the problem?
- What did you think was a good solution?
- What did you need to do to make it happen?
- Did other people help you?
- What did you learn from the process?
- How did you feel about yourself?

As students share their experiences, they're building a template for how to pursue social action and starting a list of potential projects.

A Wake-Up Call

But some kids don't seem to have a clue about activism. Their idea of social justice is being first in the cafeteria line at any cost. It's not hopeless—they're probably just not paying attention. But rather than waiting around for them to "discover" social justice issues, you can jump-start the process by introducing them to some extraordinary kids—just like them—who are experts at this game.

Get Phillip Hoose's book, *It's Our World, Too: Stories of Young People Who Are Making a Difference* (Joy Street, 1993). It celebrates 14 heroic kids who saw problems in their world and solved them. Your students will be dazzled from the very first page. They'll meet Justin Lebo, who reconstructed nearly 200 bikes from used bicycle parts and gave them to kids who were homeless, had AIDS, or were orphans. They'll love James Ale, whose friend was struck by a car while they were playing ball in a busy street. James wondered why he and his buddies had to play in the street, when the kids in the rich part of town had parks. He transformed his anger into a campaign and eventually convinced city officials to build a park in his neighborhood.

Ask your students, Why do you think these kids were successful? What did they know or learn how to do? Have the students list the personal traits and skills that helped these young activists succeed. Post the list prominently and refer to it often as you close in on your own projects.

I've used Hoose's book dozens of times, with adults and children, and the reaction is always the same—awe and discontent. Students recognize that these kids are doing something real and important. That's the awe factor. But they're filled with questions: Could I do that? Would I? Are there problems like that in my community? How could I find them? Do I have the courage to act? A new standard of behavior replaces the status quo, and kids wonder whether they can measure up. That's what causes the discontent, and it's a perfect platform for action.

But What Does It Look Like?

The best social action projects are like an earthquake. One minute you're comfortably ensconced in your classroom, earnestly working through your curriculum, and the next minute, the ground shifts. Even before the room stops rocking, you sense that you're in new territory, face-to-face with a genuine adventure. The best projects come organically from the work and conversations you have with your students every day.

Sometimes students will burst through the door on red alert and demand that their peers sit up and take notice. Here are a few examples:

- Barbara Lewis's 5th grade students waged a campaign to have a hazardous waste site near their school closed and cleaned up. Through their efforts, the toxic barrels were removed. The students won the 1989 President's Environmental Youth Award.

- Students organized a boycott of chocolate candy manufacturers at Halloween to register their support for fair trade chocolate.
- A group of 8-year-olds in Los Angeles were discouraged by the profusion of broken furniture and large appliances dumped on the sidewalks around their school. They worked their way zealously through the sanitation bureaucracy until they made contact with the large haulers responsible for removals. The debris vanished, and in a moment of jubilant inspiration, the students collected any interesting junk left behind and created a 10-foot commemorative sculpture for the school entrance.
- Canadian students helped students in Africa and Afghanistan by raising money to remove land mines from schoolyards.
- A group of 2nd and 5th graders campaigned for fellow students to boycott any ice cream trucks that sold toy guns along with their sweets. These students had decided that their community didn't need another weapon—either real or a look-alike.
- Many students have joined Amnesty International Kids (www.amnestyusa.org) and respond with letters and e-mails to monthly Urgent Action postings.

What About Standards?

When you include social justice projects in your social studies program by teaching what activists do, think, and know, your students will develop and demonstrate skills that are fundamental to a rigorous standards-based approach to social studies. In fact, teachers who are bold enough to embrace an activist approach to teaching find themselves scrambling to *add* to the standard curriculum impromptu lessons in trickle-down economics, writing a press release, making an effective speech in under three minutes, using graphic design principles for making posters, and learning the fundamentals of negotiation. Many teachers report that their students exceed expectations on dozens of

standards. Moreover, students experience the thrill of road testing their courage, persistence, ingenuity, intelligence, and diplomacy—not to mention the pride of contributing to the welfare of others.

Here are just a few of the cognitive challenges that students will face when they're immersed in the work of creating a more just society. Students will

- Examine what it means to be a citizen.
- Identify ways people can participate in their government.
- Discuss the importance of political leadership and public service.
- Locate, access, organize, and apply information about an issue of public concern.
- Use spoken, written, and visual forms of communication effectively with a variety of audiences to promote their social justice efforts.
- Use knowledge of government, law, and politics to make decisions about and take action on local, national, and international issues to further the public good.
- Examine and develop others' ethical and moral reasoning.

Responsibility—Ours and Theirs

As educators, we hold the next generation of voters, politicians, and corporate leaders in our hands. Teaching students about interdependence and responsibility through social action is a lesson that can stick.

Active, inquisitive citizenship can begin when kids are very young. They should act out early and often, until championing worthy causes becomes a habit they can't break. You won't regret a minute you spend guiding your students to discover their roles as stewards of the environment and champions of human rights.

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Part 5

Using Assessment
to Spur Achievement

Assessing What Matters

Robert J. Sternberg

*Worthy assessments should reflect the broader capabilities
that students need to thrive in the 21st century.*

My freshman-year introductory psychology course was designed like most courses one finds not just at the college level, but from middle school onward. The main means of teaching was lecture, and the main assessment of performance was a set of tests that measured our recall and basic understanding of the facts taught in the course. I got a *C*. My professor commented to me, “There is a famous Sternberg in psychology, and it looks like there won’t be another one.” I got discouraged, left psychology, and came back only when I was failing my introductory course for math majors and decided a *C* was better than an *F*.

Thirty-five years later, I became president of the American Psychological Association, which, with a membership of 155,000, is the largest professional organization of psychologists in the world. In some ways, it is the best position one can get in the field of psychology. I cracked to my predecessor that it was ironic that I, who had gotten a *C* in my introductory course, was now president of the association. He looked me straight in the eye and admitted that he, too, had gotten a *C*.

This vignette points out in microcosm what may be wrong with the assessments to which we, as a society, have committed ourselves. As a teacher or administrator, how many times have you had to take a multiple-choice or fill-in-the-blank test except perhaps, when you needed to show that you were supposedly qualified for your job? When

I look at the skills and concepts I have needed to succeed in my own field, I find a number that are crucial: creativity, common sense, wisdom, ethics, dedication, honesty, teamwork, hard work, knowing how to win and how to lose, a sense of fair play, and lifelong learning. But memorizing books is certainly not one of them.

One can argue, with justification, that one cannot think without content to think with and about. This is indisputable. But when we teach only for facts, rather than for how to go beyond facts, we teach students how to get out of date. For example, the facts that I learned in my introductory psychology course matter little today. An introductory text today contains almost entirely different facts. I know: I am the author of one of those textbooks (Sternberg, 2004). Other fields, such as the hard sciences, political science, economics, and so forth, change at least as rapidly. Even the humanities change: A set of classic works remains, but the interpretations—and even what constitutes such interpretations—change.

So what should we assess? We should assess what students need to become active and engaged citizens of the world in which they will live—in a sense, what it takes to be “expert” citizens. Oddly enough, a lot of models can prepare students for the roles they will play in their world. Traditional schooling just does not happen to be one of them. We should also assess in ways that can help students develop the skills they need for success in school and life.

Consider students on an athletic team. They learn declarative knowledge about the sport. But learning the rules of the game will no more help them in playing the game than memorizing a book of rules on driving will help someone drive. The students also need to learn how to play the sport.

But the most important skills they learn have nothing to do with one sport or another. These skills are very much like those I mentioned previously: dedication, honesty, teamwork, common sense, and the wisdom to distinguish right from wrong. Athletics is not the only model for such learning. Consider the members of an orchestra or of a dance

ensemble. They, too, must learn to work together and must develop similar skills.

How might assessments better reflect the kinds of skills that matter—not just in school, but also in life beyond school? This is a question that we in the Center for the Psychology of Abilities, Competencies, and Expertise, formerly at Yale and now at Tufts University, have posed for ourselves. It is a challenge that we have, to some extent, taken as our life work.

Assessing for WICS

The model that underlies our assessments is called WICS, which is an acronym for *wisdom, intelligence, and creativity, synthesized* (Sternberg, 2003). The basic idea underlying this model is that active and engaged citizenship and especially leadership require individuals to have (1) a creative vision for how they intend to make the world a better place, not just for themselves, but also for their family, friends, colleagues, and others; (2) the analytical intellectual skills to be able to explain why their vision, and that of others, is a good one; (3) the practical intellectual skills to be able to execute their vision and persuade others of its value; and (4) the wisdom to ensure that their ideas represent a common good, not just their own interests or those of their friends or family. Can we apply this model to assessments that can be used in schools? We have done a variety of projects suggesting that we can.

The Successful Intelligence Model

Some of our earlier projects were based on the predecessor of WICS—the model of successful intelligence (Sternberg, 1997). The programs in this model were designed to determine whether we could teach and assess students for memory and for analytical, creative, and practical achievement in the context of any academic subject at any grade level. At that point, wisdom was not separated from practical

skills, although it is distinguishable from them. Wisdom involves using academic and practical intelligence, as well as creativity and knowledge, for a common good. If, for example, a used-car salesman convinces customers to buy bad cars, he could be high in practical (or emotional) intelligence without being wise.

As an example, in social studies, we might assess understanding of the American Civil War by asking such questions as (1) Compare and contrast the Civil War and the American Revolution (*analytical*); (2) What might the United States be like today if the Civil War had not taken place (*creative*)? (3) How has the Civil War affected, even indirectly, the kinds of rights that people have today (*practical*)? and (4) Are wars ever justified (*wisdom*)?

In English, we might assess understanding of a novel such as *The Adventures of Tom Sawyer* by asking (1) How was the childhood of Tom Sawyer similar to and different from your own childhood (*analytical*)? (2) Write an alternate ending to the story (*creative*); (3) What techniques did Tom Sawyer use to persuade his friends to whitewash Aunt Polly's fence (*practical*)? and (4) Is it ever justified to use such techniques of persuasion to make people do things they do not really want to do (*wisdom*)?

In science, we might ask (1) What is the evidence suggesting that global warming is taking place (*analytical*)? (2) What do you think the world will be like in 200 years if global warming continues at its present rate (*creative*)? (3) What can you, personally, do to help slow down global warming (*practical*)? and (4) What responsibility do we have, if any, to future generations to act on global warming now before it gets much worse (*wisdom*)?

In mathematics, we might ask (1) What is the interest after six months on a loan of \$4,000 at 4 percent annually (*analytical*)? (2) Create a mathematical problem involving interest on a loan (*creative*); (3) How would you invest \$4,000 to maximize your rate of return without risking more than 10 percent of the principal (*practical*)? and (4) Why

do states set maximum rates of interest that lenders can charge, and should they do so (*wisdom*)?

We have found in studies of reading, social studies, science, and mathematics at a variety of grade levels that teaching for analytical, creative, and practical thinking, as well as for memory, boosts achievement on tests that measure achievement broadly, across subject-matter areas and grade levels (see Grigorenko, Jarvin, & Sternberg, 2002; Sternberg, Grigorenko, Ferrari, & Clinkenbeard, 1999; Sternberg, Torff, & Grigorenko, 1998). Interestingly, even when students are assessed solely for memory, they perform better when taught broadly than when taught just for memory. This is because broader teaching enables students to capitalize on their strengths and correct or compensate for their weaknesses in learning. For example, broader teaching might involve encouraging students who are more visually oriented and less numerically oriented to draw a diagram to help them visualize and solve an algebra problem. Students who are more numerically oriented might proceed directly to constructing a set of equations.

Assessing Creative and Practical Thinking

In our society, a problem with teaching and assessing more broadly is that the kinds of standardized assessments we currently use are quite narrow. For example, the SAT Reasoning Test and the SAT Subject Tests assess primarily remembered knowledge and analytical skills applied to this knowledge. Creativity, practical thinking, and wisdom are assessed minimally or, more likely, not at all. Is there any hope that our society can transport some of these skills to high-stakes assessments?

My collaborators and I decided to find out. In one study, the Rainbow Project, we designed tests of creative and practical thinking that could supplement tests like the SAT Reasoning Test, which measures analytical skills in the verbal and mathematical domains. We tested 1,013 high school students and college freshmen from 15 different

schools. We posed analytical questions much like those traditionally found on standardized tests. But we also asked the students to answer creative and practical questions.

The creative tests required the students to stretch their imaginations. For example, they might be asked to write a creative story with a title like *The Octopus's Sneakers* or *3821*. Or they might be shown a collage of pictures, such as of musicians or athletes, and be asked to tell a story about the collage. Or they might be asked to caption an untitled comic strip.

The practical tests required the students to solve everyday problems. Some tests were presented verbally; others, through videos. For example, students might see a movie showing a student about to ask a professor for a letter of recommendation, but also showing the blank look on the professor's face, indicating that he did not know who the student was. The task would be to decide what the student should do. Or students might see a video that shows a group of friends trying to figure out how to move a large bed up a winding staircase.

There were three crucial findings (Sternberg & the Rainbow Project Collaborators, 2006). First, in addition to the information that the tests provided about students' creative and practical thinking capabilities, we learned something important about multiple-choice problem solving: Multiple-choice tests, no matter what they were supposed to measure, clustered together. Students who were better at one multiple-choice test tended to be better at others as well. This result suggested that using multiple-choice tests consistently tends to benefit some students and not others.

Second, we discovered that using broader tests for college admissions can enhance academic excellence. When compared with using SAT scores alone for predicting freshman-year grades, using these broader tests enabled us to double the accuracy of that prediction. Compared with the predictive value of SAT scores and high school grade point average combined, we increased the accuracy of prediction by about 50 percent. In other words, our assessments were not

quixotic ventures into esoteric realms. On the contrary, they enhanced our ability to predict who would be more, as opposed to less, successful in college, at least from an academic point of view.

Third, we discovered that we could substantially reduce ethnic group differences with the tests. In other words, using such tests could increase the proportion of ethnic minorities admitted to selective colleges. The tests would not compromise academic excellence, but actually enhance it. Because different ethnic groups have different conceptions of what intelligence is (Sternberg, 2006), they tend to socialize their children to be intelligent in different ways. For example, on our tests, American Indians, on average, performed lower than most other groups on analytical assessments. But on oral storytelling, they had the highest average scores. Different groups excel, on average, in different ways; giving them a chance to show how they excel enables them to show that they can succeed.

Tests like the Rainbow Assessment do not benefit only members of ethnic minority groups. Many students who come from the majority group, and even from well-off homes, learn best in ways that are different from those assessed by conventional standardized tests. Our tests help identify such students.

Increasing Quality and Diversity

It is one thing to have a successful research project, and another actually to implement the procedures in a high-stakes situation. We have had the opportunity to do so.

In 2005, I moved from Yale University, where I was the lead collaborator in the Rainbow Project, to Tufts University, where I became dean of the School of Arts and Sciences. Tufts University, under the leadership of its president, Lawrence Bacow, has strongly emphasized the role of active citizenship in education. So it seemed like an ideal setting to put into practice some of the ideas from the Rainbow Project. In collaboration with Linda Abriola, dean of the School of Engineering,

and Lee Coffin, dean of admissions, I instituted Project Kaleidoscope, which implements the ideas of Rainbow but goes beyond that project to include in its assessments the construct of wisdom.

On the 2006–07 application for all of the more than 15,000 students applying to the schools of Arts, Sciences, and Engineering at Tufts, we placed questions designed to assess WICS (Sternberg, 2007). Whereas the Rainbow Project was a separate high-stakes test administered with a proctor, the Kaleidoscope Project was a section of the Tufts college application. The advantage of the Kaleidoscope Project is that it got us away from the high-stakes testing situation in which students must answer complex questions in very short amounts of time under incredible pressure. The section was optional this past year, and students were encouraged to answer just a single question.

For example, a creative question asked students to write stories with titles like “The End of MTV” or “Confessions of a Middle School Bully.” Another creative question asked students what the world would be like if some historical event had turned out differently, for example, if Rosa Parks had given up her seat on the bus. Yet another creative question, a nonverbal one, gave students an opportunity to design a new product or an advertisement for a new product. A practical question queried how students had persuaded friends to adopt an unpopular idea. A wisdom question asked students how they might apply a passion they had toward the common good.

We now have the results of our first year of implementation, and they are promising. Some stakeholders were afraid that the number of applications would go down; instead, they went up slightly. More notable, the quality of applicants rose substantially. There were fewer students in what before had been the bottom third of the pool in terms of academic quality. Many of those students, seeing the new application, decided not to bother to apply. Other stakeholders were afraid that average SAT scores might plummet. Instead, they went up. This is because the new assessments are not negatively correlated with SAT scores. Rather, they are not much correlated at all.

So adopting these new methods does not result in admitting less-qualified applicants. Rather, admitted applicants are *more* qualified, but in a broader way. Moreover, after several years in which the number of applications by underrepresented minorities remained relatively flat, this year they increased substantially. In the end, we admitted 30 percent more black students than the year before and 15 percent more Hispanics. Our results, like those of the Rainbow Project, showed that it is possible to increase academic quality and diversity simultaneously and to do so for an entire undergraduate class at a major university. Most important, we sent a message to students, parents, high school guidance counselors, and others that we believe there is more to a person than the narrow spectrum of skills assessed by standardized tests and that we can assess these broader skills in a quantifiable way.

Such projects can be done at any level. We designed an admissions test for a well-known private school, which showed results for a whole class that were comparable to those for the Rainbow Project. We also did a project in a large business school and showed that we could increase the accuracy of prediction and decrease both gender and ethnic group differences in admissions (Hedlund, Wilt, Nebel, Ashford, & Sternberg, 2006). We are currently developing a comparable test for middle school students (Chart, Grigorenko, & Sternberg, in press).

One might wonder how to assess responses to questions that seem so subjective. The answer is through well-developed rubrics. For example, we assess analytical responses on the basis of the extent to which they are analytically sound, balanced, logical, and organized. We assess creative responses on the basis of how original and compelling they are, as well as on the basis of their appropriateness to the task presented. We assess practical responses on the basis of how feasible they are with respect to time, place, and human and material resources. We assess wisdom-based responses on the extent to which they promote the common good by balancing individual interests with others' larger interests, over the long and short terms, through the infusion of positive (prosocial) values.

Promoting Wisdom

Perhaps conventional assessments met the cognitive demands placed on students 100 years ago. They do not meet the cognitive demands of the world today. Active and engaged citizens must be creatively flexible, responding to rapid changes in the environment; able to think critically about what they are told in the media, whether by newscasters, politicians, advertisers, or scientists; able to execute their ideas and persuade others of their value; and, most of all, able to use their knowledge wisely in ways that avoid the horrors of bad leadership, as we have seen in scandals involving Enron, Arthur Andersen, Tyco, Clearstream, and innumerable other organizations.

It may be a hard sell to teach and assess for wisdom. However, wisdom is the most important and yet most neglected aspect of education today (Sternberg, 2001a, 2001b). We have seen in failed leaders the enormous costs of having leaders who are knowledgeable and intelligent—who have “good degrees” from prestigious schools—yet who are unwise. They tend to commit several serious cognitive fallacies. They are (1) *unrealistically optimistic*, believing that anything they do will turn out well because they are so brilliant; (2) *egocentric*, believing that the world revolves around them; (3) *falsely omniscient*, failing to learn from experience because they believe they know everything; (4) *falsely omnipotent*, believing that they are all-powerful by virtue of their superior skills or education; (5) *falsely invulnerable*, believing they can get away with almost anything because they are so clever; and (6) *ethically disengaged*, believing that ethical principles apply only to lesser mortals. In my view, much of what is wrong in the world today stems from people who are simultaneously smart and foolish.

Four caveats are in order here. First, my work on WICS and successful intelligence is not the only theory on the basis of which we might create new, broader assessments. Howard Gardner’s (1999) theory of multiple intelligences provides another basis for such assessments, and other theories could be used as well. Second, the assessments

do not measure all the skills required for success in everyday life. For example, although I assess teamwork in the courses I teach, the assessments I have described do not measure this skill, at least not directly. Third, the assessments have not been scaled up for use on a statewide or national basis. Doing so would no doubt present new challenges. Fourth, expanded assessments cost more time and money. But when we consider the benefits of opening up possibilities and hope to diverse students who learn and think in a variety of ways—whatever their gender or ethnic background—the costs may be relatively small.

Worthy and Wise

There is another issue we need to face. Traditional assessments provide little help to students in learning how to capitalize on strengths and compensate for or correct weaknesses. They measure only narrow bands of skills. Broader tests can give broader ranges of scores and help students see where they have mastery and where they need to improve. Teachers, in turn, can teach in ways that help students acquire the skills they need to succeed in school and life (Sternberg & Grigorenko, 2000, 2007). From this point of view, instruction and assessment are two sides of the same coin rather than two different coins. Assessment drives instruction.

So let's create assessments that are worthy of such a role. To prepare students for a world in which political, economic, social, and even climatic contexts are rapidly changing, we must focus on more than just facts and figures. Our society needs citizens and leaders who are not just memorizers and who are more than just analytically adept. We need people who are creative, practical, and, especially, wise.

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The Best Value in Formative Assessment

Stephen Chappuis and Jan Chappuis

Ready-made benchmark tests cannot substitute for day-to-day formative assessment conducted by assessment-literate teachers.

Recently a school leader asked us to provide an example of a good test item on a formative assessment and then show how that item would be different when used on a summative test. He wanted to explain to his staff the difference between formative and summative assessment. His end goal was for teachers to develop assessments to measure how well students were mastering the content standards that would appear on the state accountability test before the test was given in the spring.

His question reflects the confusion many educators have about formative and summative assessment. This confusion isn't surprising: Definitions of formative assessment abound, resulting in multiple and sometimes conflicting understandings. And in part because of these varying definitions and views, practices labeled as formative assessment in schools today vary widely.

One result of No Child Left Behind has been a surge in student testing—much of it voluntary, going well beyond what federal law or state assessment systems require. Many schools and districts administer tests with names like *benchmark*, *short-cycle*, and *interim assessments* to predict student performance on high-stakes tests and to identify students needing additional help. This increasingly popular

level of testing has contributed to the widening scope of what is called formative assessment.

Testing companies in the K–12 education market, seeking to support the trend toward more testing, sometimes advertise products as “formative assessments.” This adds to the confusion by encouraging the idea that it’s the test itself that’s formative (Chappuis, 2005).

In reality, this level of testing is often little more than a series of minisummative tests, not always tightly aligned to what was taught in the classroom. There is nothing inherently formative in such tests—they may or may not be used to make changes in teaching that will lead to greater student learning.

The Difference Between Summative and Formative

What is formative assessment, then? First, it’s not a product. That was the central misunderstanding of the administrator who asked for an example of a good formative test item. Even though assessments will continue to be labeled *formative* or *summative*, how the results are used is what determines whether the assessment is formative or summative.

To begin, let’s look at summative assessment. In general, its results are used to make some sort of judgment, such as to determine what grade a student will receive on a classroom assignment, measure program effectiveness, or determine whether a school has made adequate yearly progress. Summative assessment, sometimes referred to as assessment *of* learning, typically documents how much learning has occurred at a point in time; its purpose is to measure the level of student, school, or program success.

Formative assessment, on the other hand, delivers information *during* the instructional process, *before* the summative assessment. Both the teacher and the student use formative assessment results to make decisions about what actions to take to promote further learning. It is an ongoing, dynamic process that involves far more than

frequent testing, and measurement of student learning is just one of its components.

Summative Assessment Used in Formative Ways

Almost any assessment instrument can be used for summative or formative purposes, but some, by design, are better suited to summative use and others to formative use. For example, state assessments, although they may also have some limited formative use, are designed to provide accountability data and to compare schools and districts. Because their primary purpose is summative, the results may not be communicated in ways that teachers and students can easily interpret and work with. Further, the results are often delivered months after the administration of the tests. For these reasons, such state tests usually do not function well in a formative way: They can't contribute much information to guide day-to-day instruction or help determine the next learning steps of individual students.

Benchmark assessments, either purchased by the district from commercial vendors or developed locally, are generally meant to measure progress toward state or district content standards and to predict future performance on large-scale summative tests. A common misconception is that this level of assessment is automatically formative. Although such assessments are sometimes intended for formative use—that is, to guide further instruction for groups or individual students—teachers' and administrators' lack of understanding of how to use the results can derail this intention. The assessments will produce no formative benefits if teachers administer them, report the results, and then continue with instruction as previously planned—as can easily happen when teachers are expected to cover a hefty amount of content in a given time.

Teachers also select or develop their own summative assessments—those that count for a grade. Compared with state and district tests, these classroom assessments can more readily be adapted to

formative use because their results are more immediately available and their learning targets have been more recently taught. When teachers know what specific learning target each question or task on their test measures, they can use the results to select and reteach portions of the curriculum that students haven't yet mastered. Carefully designed common assessments can be used this way as well.

Students, too, can use summative test results to make decisions about further study. If the assessment items are explicitly matched to the intended learning targets, teachers can guide students in examining their right and wrong answers in order to answer questions such as these:

- What are my strengths relative to the standards?
- What have I seen myself improve at?
- Where are my areas of weakness?
- Where didn't I perform as desired, and how might I make those answers better?
- What do these results mean for the next steps in my learning, and how should I prepare for that improvement?

For students to make maximum use of these questions to guide further study, however, teachers must plan and allow time for students to learn the knowledge and skills they missed on the summative assessment and to retake the assessment. Lack of time for such learning is one of the biggest hindrances to formatively using summative classroom assessments.

Assessment *for* Learning

When teachers assess student learning for purely formative purposes, there is no final mark on the paper and no summative grade in the grade book. Rather, assessment serves as practice for students, just like a meaningful homework assignment does. This is formative assessment

at its most valuable. Called assessment *for* learning, it supports learning in two ways:

- Teachers can adapt instruction on the basis of evidence, making changes and improvements that will yield immediate benefits to student learning.
- Students can use evidence of their current progress to actively manage and adjust their own learning. (Stiggins, Arter, Chappuis, & Chappuis, 2006)

Assessment for learning can take many different forms in the classroom. It consists of anything teachers do to help students answer three questions (Atkin, Black, & Coffey, 2001):

Where Am I Going?

- Give students a list of the learning targets they are responsible for mastering, written in student-friendly language.
- Show students anonymous strong and weak examples of the kind of product or performance they are expected to create and have them use a scoring guide to determine which one is better and why.

Where Am I Now?

- Administer a nongraded quiz part-way through the learning, to help both teacher and students understand who needs to work on what.
- Highlight phrases on a scoring guide reflecting specific strengths and areas for improvement and staple it to student work.
- Have students identify their own strengths and areas for improvement using a scoring guide.

- Have students keep a list of learning targets for the course and periodically check off the ones they have mastered.

How Can I Close the Gap?

- Give students feedback and have them use it to set goals.
- Have students graph or describe their progress on specific learning targets.
- Ask students to comment on their progress: What changes have they noticed? What is easy that used to be hard? What insights into themselves as learners have they discovered?

When students use feedback from the teacher to learn how to self-assess and set goals, they increase ownership of their own success. In this type of assessment environment, teachers and students collaborate in an ongoing process using assessment information to improve rather than judge learning. It all hinges on the assessment's ability to provide timely, understandable, and descriptive feedback to teachers and students.

Feedback: The Key Difference

Feedback in an assessment *for* learning context occurs while there is still time to take action. It functions as a global positioning system, offering descriptive information about the work, product, or performance relative to the intended learning goals. It avoids marks or comments that judge the level of achievement or imply that the learning journey is over.

Effective descriptive feedback focuses on the intended learning, identifies specific strengths, points to areas needing improvement, suggests a route of action students can take to close the gap between where they are now and where they need to be, takes into account the amount of corrective feedback the learner can act on at one time, and models

the kind of thinking students will engage in when they self-assess. These are a few examples of descriptive feedback:

- You have interpreted the bars on this graph correctly, but you need to make sure the marks on the x and y axes are placed at equal intervals.
- What you have written is a hypothesis because it is a proposed explanation. You can improve it by writing it as an “if ... then ... ” statement.
- The good stories we have been reading have a beginning, a middle, and an end. I see that your story has a beginning and a middle, just like those good stories do. Can you draw and write an ending?
- You have described the similarities between _____ and _____ clearly in this paper, and you have identified key differences. Work on illustrating those differences with concrete examples from the text.

In contrast, the feedback from a summative assessment—whether given in the classroom or in a larger context—tells teachers and students who made it to the learning destination and who didn’t. The assessment’s coded, evaluative feedback—*B+*, *84%*, *Meets Standards*, *Great Job*, *Proficient*, and so on—does not identify individual student strengths and areas needing improvement. It does not offer specific information for course correction.

Advantages of Formative Classroom Assessment

Although all formative assessment practices have the potential to increase student learning, assessment for learning in the classroom offers a number of distinct benefits:

- The timeliness of results enables teachers to adjust instruction quickly, while learning is in progress.

- The students who are assessed are the ones who benefit from the adjustments.
- The students can use the results to adjust and improve their own learning.

When we try to teacher-proof the assessment process by providing a steady diet of ready-made external tests, we lose these advantages. Such tests cannot substitute for the day-to-day level of formative assessment that only assessment-literate teachers are able to conduct. The greatest value in formative assessment lies in teachers and students making use of results to improve real-time teaching and learning at every turn.

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Data in the Driver's Seat

Paul Bambrick-Santoyo

Two New Jersey schools discover the benefits of interim assessments, clearly defined standards, and data-driven instruction.

Our story starts with two public middle schools in Newark, New Jersey. Both had student populations representative of Newark's Central Ward, where 90 percent of students qualify for free or reduced-price lunch and 85 percent are black. Students in both schools were generally well behaved and academically on task.

Despite the two schools' similar student populations, their 2003 achievement results revealed two very different pictures. One school, Greater Newark Academy, was in a tailspin: Only 7 percent of its 8th grade students had passed the state math test. The second school, North Star Academy, had more respectable results—well above the district average—but it was still behind its suburban New Jersey counterparts.

Over the ensuing four years, each school made massive gains in student achievement, outstripping the district average by at least 30 points on both math and English/language arts assessments and surpassing the statewide average in almost every category. How did these two schools end up with such tremendous student achievement? Therein lies our story.

Beginning in the 2002–03 school year, North Star Academy launched a model of data-driven instruction with interim assessments at the center, and Greater Newark followed suit the next year. In this

case, interim assessments are defined as assessments given every 6 to 8 weeks throughout the school year to measure student progress toward meeting standards. Many schools are using interim assessments today, but not all are seeing such strong achievement gains. What separates those schools that use interim assessments effectively from those that do not? Certain key drivers of data-driven instruction made these two schools—and many more like them—so successful.

Assessment: Great Expectations?

Most 7th grade state math standards have a standard similar to this one used in New Jersey: “Understand and use ... percents in a variety of situations” (State of New Jersey, Department of Education, 2004). With this limited guidance, math teachers are told to teach to mastery, but it’s not always clear what mastery should look like. Consider these classroom assessment questions that six different 7th grade math teachers created to measure mastery of this standard:

1. What is 50% of 20?
2. What is 67% of 81?
3. Shawn got 7 correct answers out of 10 possible answers on his science test. What percentage of questions did he answer correctly?
4. J. J. Redick was on pace to set a college basketball record in career free throw percentage. Going into the NCAA tournament in 2004, he had made 97 of 104 free throw attempts. What percentage of free throws had he made?
5. J. J. Redick was on pace to set an NCAA record in career free throw percentage. Going into the NCAA tournament in 2004, he had made 97 of 104 free throw attempts. In the first tournament game, Redick missed his first five free throws. How far did his percentage drop from right before the tournament game to right after missing those free throws?

6. J. J. Redick and Chris Paul were competing for the best free throw percentage. Redick made 94 percent of his first 103 shots, whereas Paul made 47 of 51 shots. (a) Which one had a better shooting percentage? (b) In the next game, Redick made only 2 of 10 shots, and Paul made 7 of 10 shots. What are their new overall shooting percentages? Who is the better shooter? (c) Jason argued that if J. J. and Chris each made their next 10 shots, their shooting percentages would go up the same amount. Is this true? Why or why not? Describe in detail how you arrived at your answers.

Note how the level of difficulty increases with each question. For the first question, a student could understand 50 percent as one-half and determine the answer without actually using percentages. Questions 3–6 could be considered attempts at real-world application or critical thinking, but Question 6 requires far more critical thinking and conceptual understanding than any other question. Despite these drastic differences, every one of the questions is standards based. This leads to the central point about the relationship between standards and interim assessments: Standards are meaningless until you define how you will assess them.

In many schools, teachers define the standards according to their own level of expectation, and those expectations vary radically from one classroom to the next. Thus, different teachers teach to different levels of mastery. We cannot expect every teacher to teach the skills required for complex problems like Question 6 as the standard for learning if that expectation is not explicit and transparent.

To help teachers hold their students to a common standard of rigor, Greater Newark Academy and North Star Academy shared the same interim assessments that North Star originally designed in alignment with New Jersey state tests. In this way, they defined one common level of mastery to which every grade-level teacher should teach. Teachers saw the assessments before teaching their unit so that they

could plan their lessons with those expectations in mind. The assessments were administered every eight weeks, and the tests measured every standard that had been taught up to that date. Thus, the first step on the path to high student achievement was established: transparent, common, rigorous assessments.

Analysis: Watching “Poolside”

High-quality assessments do not guarantee student achievement; neither does the analysis of assessment results. For example, imagine a swimming coach trying to analyze the performance of his team. If he picked up the newspaper the day after the meet and read the times of his third-place swimmer, he might decide that she just has to swim faster. Yet if he had watched that swimmer at the meet, he would have noticed that she was the last one off the starting block but the fastest one in the water. At that point, his analysis would be clear: He needs to focus on getting her off the block faster.

School assessment analysis is no different. Looking at state test or interim assessment results in isolation is like reading a newspaper summary of a sports event: You can only draw summative conclusions, and those conclusions might actually be inaccurate. You have to be “poolside” to analyze effectively.

North Star developed a spreadsheet that teachers in both schools used to analyze results on the interim assessments, but the key factor was having teachers go back to the test to look at individual questions. Teachers in the two schools received results on the day after each assessment. They could then examine the data to determine where the students erred. Seeing which distractors students chose on the multiple-choice questions and examining student work on open-ended questions helped teachers recognize what students misunderstood and plan their instruction accordingly.

For example, a 6th grade math teacher thought her students had problems with rates until she analyzed the question more closely. The

question was, “How far would Jennifer travel in $2\frac{1}{4}$ hours if she drove 36 miles per hour?” The teacher analyzed the students’ answers and discovered that most chose Answer C: 72 miles, instead of the correct answer of 81 miles. Thus, the students actually understood rates—because they multiplied 2 hours by the 36 miles to get 72—but they didn’t know how to multiply by a mixed number ($2\frac{1}{4} \times 36$).

Greater Newark and North Star were able to avoid the mistakes of the swim coach by doing item-level, test-in-hand analysis. This enabled teachers to make solid, root-cause analyses, which in turn facilitated far more effective action plans. Being “poolside” made all the difference: Assessments and analysis were now linked.

Action: Taking Data out of the Binder

Even with high-quality interim assessments and effective analysis, student achievement will not improve without targeted follow-through. Most research about highly effective schools focuses on developing an action plan for reteaching particular standards (Symonds, 2003). Following this advice, schools often develop data binders containing analyses and action plans based on the previous round of assessments and keep a copy in the main office or in each classroom.

Yet the key question remains: Where is that information when teachers plan lessons? If a teacher plans lessons on Sunday night and the data binder is in the classroom, then the effect on teaching is greatly diminished. Action plans must be connected to lesson plans, which need to translate to changes in teaching.

Teachers at Greater Newark and North Star developed six-week action plans based on interim assessment results, and the most successful teachers had those action plans in hand when planning lessons. A 5th grade literacy teacher, for example, learned that her students could make basic inferences and identify the main idea, but they couldn’t keep track of the sequence of events, nor could they identify the evidence in the text that supported their inferences. So the teacher redesigned her

guided reading lessons to ask more questions related to these skills, and she created scaffolded guides to teach these skills more efficiently.

Teachers also used the action plans to design targeted tutoring sessions and differentiated small groups. Some teachers actually stapled their action plans to the front of their lesson plans to remind themselves of the connection between their assessment analysis and their teaching. The seamless coherence among assessments, analysis, and action creates the ideal classroom environment for significant gains in student learning.

Buy-In: Chicken or Egg?

Much research has been done about the data-driven culture of high-achieving schools, especially the role of teacher buy-in (Datnow, Park, & Wohlstetter, 2007). Unfortunately, the research has not adequately answered the question of whether that buy-in was a prerequisite for success—a true driver of achievement—or a by-product of a data-driven culture. An example from one of our two schools helps address this question.

When North Star launched its data-driven instruction model in 2003, most teachers were ambivalent about whether using interim assessments would have any effect. Some wondered, Don't we already assess our students and analyze their progress? A few were outright resistant.

Before the first interim assessment, North Star's leaders had teachers predict the performance of their students by labeling each question in one of three ways: *Confident* (students would answer correctly); *Not Sure* (students might or might not answer correctly); or *No Way* (students would not answer correctly). When the results came in, teachers were shocked to see that their students performed far worse than they expected. They implemented the three principles mentioned previously: using the assessments to evaluate the rigor of their teaching, doing test-in-hand analysis, and applying targeted action plans when

planning lessons. They also pored over the next assessment in advance, hungry to prove that they could do better. On that next assessment, almost every teacher had students show gains in achievement.

While the school celebrated these improvements, some teachers still resisted the process. One teacher in particular, Ms. J, was adamant that she was not really improving her teaching and was only teaching to the test. At the end of the 2003–04 school year, school leaders compared her results from the previous year with the current year and saw that her students that year had shown much stronger gains in reading and language than did her students for the previous year, before interim assessments were implemented. The teachers and school culture were the same for both cohorts; the only thing that changed was effective implementation of interim assessments. Although Ms. J clearly saw the incredible gains she had made, she still did not fully endorse the process.

Two years later at a faculty meeting, teachers debated shortening one part of the analysis and action plan process. Ms. J stood up and firmly defended keeping the process as it was because of the incredible value it added to her teaching. In two years, this teacher had gone from being the most vocal opponent to being an ardent supporter. The results came first; the buy-in came next. Data-driven instruction does not require teacher buy-in—it creates it.

Creating Better Schools

Greater Newark Academy and North Star Academy started at two different places when they decided to implement data-driven instruction: One was in danger of sanctions, and the other was considered good but had not made the transition to excellence. Both saw significant gains as a result of the effective implementation of interim assessments, which included a preestablished assessment calendar and a trained leadership team. In essence, they shifted the focus of the schools from what was being taught to what the students were learning.

These two schools are not alone. Over the past three years, more than 500 school leaders have attended workshops that I have delivered through New Leaders for New Schools and for various school systems. Participants then launched interim assessments and data-driven instruction in their schools. From this work have come dramatic student achievement gains in charter and district schools in the San Francisco Bay Area, Chicago, New York, Memphis, Baltimore, and Washington, D.C. With the proper interplay among interim assessments, analysis, action and data-driven culture, schools can be transformed, and a new standard can be set for student learning.

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Formative Assessment That Empowers

Susan Brookhart, Connie Moss, and Beverly Long

When a rural district encouraged teachers to turn assessment into ongoing communication, students learned to advance their own learning. So did teachers.

It's a paradox. When teachers hand over to students the power to shape their own learning, the learning that occurs is often more powerful than what would have transpired if the teacher had directed learning activities. Even the most effective teacher can't do students' learning *for* them. Effective teachers create opportunities that maximize the chances learning will happen. By providing students and teachers with specific, regular feedback on how well students are mastering key concepts and skills, formative assessment helps teachers create such opportunities.

Formative assessment is all about sharing information. Teacher-to-student communication—teachers showing students where teachers believe learning should be headed and what students need to do to get there—is important in formative assessment, just as in conventional assessment. But the power of formative assessment comes from the addition of student-to-teacher communication. Each student shows the teacher all along the way where his or her understanding is deep, shallow, or stalled.

This mutual communication empowers students, makes teachers more effective, and restores students' natural love of learning. Most

children begin school excited to learn, yet over time they become more oriented toward grades than toward learning (Brookhart, 2004). Traditional assessment practices that express judgment and foster competition do that to them. Formative assessment, however, replaces judgmental assessment practices with information exchange and cooperation. This kind of assessment convinces students that teachers really want to understand what and how they think, rather than whether they know the “right” answers. Students feel permitted to think for themselves and to openly share their understandings—which frees them to become the driving force in their own learning.

A Districtwide Partnership Fuels Formative Assessment

Recently, teachers in Armstrong School District in western Pennsylvania discovered how fundamentally a focus on formative assessment can transform students’ sense of control over their learning—as well as fuel teacher learning. Armstrong is a rural district serving 6,308 students; more than 50 percent of Armstrong’s students are economically disadvantaged, and 12 percent receive special education services.

The district participated in a three-year initiative with the Center for Advancing the Study of Teaching and Learning in Pittsburgh. Initially, six teachers came together to learn about implementing formative assessment practices with the ultimate vision of increasing student-teacher communication and students’ sense of ownership over learning. These teachers helped spread the initiative across the district. Approximately 85 teachers now meet regularly in small groups to help one another implement formative assessment. More than 60 first-year teachers (who are required to participate) and many seasoned veterans are involved. District administrators make a point of looking for formative assessment practices during classroom visits.

The teachers use the Teaching as Intentional Learning model, which operates on the principle that teachers grow through intentional

inquiry related to real questions that come up in their classroom practice (Moss, 2001).

During the years we observed the Armstrong teachers intentionally working formative assessment into their teaching, we heard teachers talk a lot about the connection between formative assessment and student motivation. Over and over, teachers saw students get excited as formative assessment provided them more awareness of and control over their own learning. Armstrong teachers became excited too as they watched self-efficacy and self-regulation skills kick in for formerly unmotivated students. As one teacher noted,

I have learned not to underestimate the hand that students play in their own learning. ... If students are taught the importance of using specific strategies, if they understand how to use those strategies, and if they understand what they do well and what they need to work on, they will be empowered to improve.

Formative assessment contributes to student ownership of learning more than any other classroom-based practice. Bloom (1984) found that student achievement, motivation, and time on task were significantly higher in classes characterized by formative assessment (a key element of Bloom's mastery-learning approach), even compared with students taught by the same teacher with more conventional methods.

Armstrong's focus on formative assessment has led to increases in achievement, motivation, time on task, and engagement for students working with participating teachers (Brookhart, Moss, & Long, 2008). According to their journal entries and responses to a survey, teachers have seen positive effects on students' learning; on students' feelings of competence (self-efficacy); and on students' perceptions that they have the necessary tools to help advance their own learning (self-regulation).

State test results indicate that the percentage of students scoring at the Basic and Below Basic levels has decreased dramatically at every grade level throughout the years teachers have been involved in the

initiative. For example, the percentage of 3rd graders scoring at Below Basic on the state reading test dropped from 13.4 percent in 2006 to 6.1 percent in 2008. When the scores for 3rd graders receiving Title I funds are separated out, the results are even more striking: Only 7.4 percent scored at Below Basic in 2008, compared with 22.2 percent in 2006.

Glimpses of Increased Ownership

We spot examples of student ownership of learning every time we observe the classrooms of Armstrong teachers. One elementary reading teacher, for example, changed the look and feel of her class to promote independent work. She established flexible centers and taught students several self- and peer-assessment strategies. One such strategy involves placing three sheets of construction paper—green, yellow, and red—on a desk. Students quiz one another on sight words, definitions, or other content written on a flash card. If the student being quizzed gives an immediate correct response, the questioner lays the flash card on the green paper; if the answerer hesitates or self-corrects, the card goes on the yellow paper; and for an incorrect response, it goes on the red paper.

We observed two 6-year-old boys quizzing each other on sight words. Mike, the quizzier, held up the word *any*. Kerry responded *a*, then corrected himself and said, *Amy*. Kerry's eyes moved expectantly to the yellow paper, but Mike laid the card on the red. "Hey," exclaimed Kerry, visibly upset. With a withering look and a perfect dead-pan expression, Mike said, "It ain't Amy."

Granted, Mike should have told Kerry what the word *was*, not just what it was not. But it was clear that these boys were engaged and in charge of their own learning. Their assessment of each other was for learning, not for a grade, and they cared about where those flash cards were placed. More interesting, although more subtle, was seeing both boys' expectations play out. Both monitored their responses, knew (mostly) whether they were right or wrong, self-corrected, and

intentionally aimed for the green. We could see all this in their faces before a flash card ever landed.

In another classroom, we watched 7th graders use a checklist and rubric they had created to plan, monitor, and refine their drawings of the water cycle and the paragraph they wrote to describe the relationships among evaporation, condensation, precipitation, transpiration, and surface run-off. As their science teacher walked through the room, he commented on positive aspects of each student's work and mentioned connections between the work and the rubric's criteria for success. But it was the students who spent many class periods engrossed in checking the accuracy and quality of their drawings and text, improving both as they got closer to a polished product.

As formative assessment permeated the learning routines of these teachers' classrooms and as students increasingly got into the habit of assessing ongoing learning, student ownership expanded to broader learning outside the classroom. Knowing that repeated reading enhances students' oral fluency, one reading specialist had students create and use a take-home folder for fluency practice. Each night, 1st grade students read out loud to an adult at home and had that adult sign a journal indicating that practice had taken place. One challenged reader, Barry, arrived at his remedial reading session with a journal page that had at least six signatures crammed into the tiny box. Curious, the teacher asked, "Why did you have so many people sign your journal?" Barry's indignant reply—"I *am* trying to become fluent"—clearly demonstrated that he had internalized the ideal of fluency and taken ownership of his own journey toward becoming a more accomplished reader.

The Teachers' Journey Over Time

Stages of Growth

Integrating formative assessment practices into routines to the extent that students begin to monitor and drive their own progress is

a significant departure from traditional practice. It took Armstrong teachers time to change. Participating teachers went through a developmental sequence, similar to the progression that we have observed among teachers honing formative assessment in other settings.

First, as teachers became aware of formative assessment characteristics and practices, most teachers recognized that they were already doing some formative actions—such as giving students general feedback—and entered an initial stage that we call *consciousness raising*. Teachers at this stage said that they already practiced formative assessment but just didn't call it that; they wondered what all the fuss was about. One common misconception at this stage is for teachers to believe they are explaining the learning target to students, when all they are really doing is giving students a number to beat. ("Let's see if you can score at least a 51.") Explaining a learning target means helping students form an idea of what it means to understand a concept or be able to perform a specific skill to a high standard, not just telling students what score would reflect improvement.

Teachers then entered a second stage we call *skill building* in which they developed and used formative assessment more deliberately to meet the needs of their individual classrooms. They realized that there is more to formative assessment than they had thought.

Finally, after they had used formative assessment strategies customized to their students and content for some time, teachers moved into an *intentional* stage, in which they realized the power of deliberately sharing information with students and in which they strategically employed formative assessment practices.

Distinguishing the Real Deal

Once they reached this intentional stage, the Armstrong teachers could distinguish between their new formative assessment skills and their previous, less comprehensive formative practices. They saw what they needed to do to keep students' engagement and initiative

in learning increasing. At the beginning of their work with formative assessment, for example, many teachers assumed that they were giving “specific” feedback. As their formative assessment-related groups continued to meet, they recognized that their feedback lacked enough specificity to make it useful to student learning; their words weren’t helping each student understand what to do next or do differently so they weren’t leading to improvement.

A second difference emerged in the area of classroom record keeping. Teachers discovered that they needed not only to keep more records but also to perform more systematic note taking and record keeping.

Teachers also saw the need to bolster their communication with students. As good teachers, they were already interested in involving students in instruction and assessment. As they deepened their knowledge of formative assessment, they communicated with students more, and they heightened their expectations that students would do something particular with assessment information—not just “study.” An elementary reading teacher described how she improved both record keeping and communication:

After I am finished assessing students, I record informal observation notes. I tell the student what I am writing down, and what it means. For example: “I am writing that you did a good job finger tracking today. I am also writing down that you had a little trouble sounding some words out, out loud. It’s really important for you to sound a word out with your voice when you’re not sure of it. You will get the word a lot faster that way.” After I write the notes on my assessment sheet, I give the student a kid-friendly note with the same contents. The student can then take this note home to show parents.

A final difference, and perhaps the most important, appeared in the language that teachers used to describe their efforts. As teachers developed increasingly sophisticated understandings of formative

assessment, intensified their record keeping, focused on improving feedback, and strengthened their emphasis on communication, the language that they used to describe formative assessment shifted from “assessment language” to phrases that referred to formative assessment as an instructional strategy. In doing so, they linked formative assessment with differentiating instruction. As one teacher said,

I used to view assessment ... as evaluating my students' work.
... Now I view formative assessment as an ongoing process [in which I] set a specific goal for instruction, teach with that goal in mind, assess whether students have met the goal, and use the results to decide on the next step of the instruction.

Practices That Spur Ownership

The Armstrong teachers found that the following practices helped them support students' motivation and active investment in their own learning. It's worth noting that these are *teacher* practices. So here is our paradox: The teacher is in control of how much control the student experiences!

Clearly communicate to students the learning target—in your words, in instructional activities, and in assignments. Check to make sure they really understand what that target is. Without an “I know where I'm going” feeling, students passively go wherever a teacher takes them. For example, here's how an elementary teacher shared the learning target of a language arts lesson with students:

Today we're going to learn how to make predictions about a story before we read it. ... Making predictions is an important part of understanding what we read. You will know you have made a good prediction if you have connected the title, the picture, and the selected vocabulary to make an intelligent guess about the story's main idea.

Give descriptive feedback that is tied to the learning target.

Describe students' work and the processes they used to do it; make sure they understand the connection. An example of this kind of feedback comes from an 8th grade technology education class at Armstrong. Students created a balsa-wood bridge using their knowledge of compression and tension. The assignment enabled students to demonstrate their understanding of how forces act on a structure when load is applied—and to analyze what they did to pinpoint areas of weakness according to load distribution. The teacher's feedback to one student not only described what that student had done well but also provided the student with a clear set of next steps to progress toward the learning target:

You made good use of triangles in your structure. ... Here are some ways to analyze what you did to improve your design. Check the areas of weakness and ask yourself if they are well supported. Remember that you must have at least 40 cross members. Also ask yourself if smaller or bigger spaces are stronger and use that information to refine your design. Finally, look for areas of weakness and see how you can add supports. For instance, a center line will help with symmetry.

Give guidance that helps students realize they can do what they need to do. Provide clear feedback and achievable steps toward improvement. Help students see the connections between specific strategies that they used and their accomplishments. If those strategies are not helping them meet the learning target, suggest or teach them a strategy that will. Revealing the connection between what students *do* and what they learn leads them toward self-efficacy.

You can see this strategy come to life in an example from an 11th grade history class. The students' task was to investigate factors leading to the French Revolution and determine whether the people of France had cause to use violence, citing specific reasons to support

their conclusion. The teacher's feedback highlighted the connection between what students did and what they learned:

Your use of specific examples showed that you considered many factors on both sides of the issue; this is a critical component of analytical reasoning and decision making. You told specific ways that King Louis XVI ignored the suffering of the people and drove them to violence. You can strengthen your conclusions by providing specific supporting details for each example that you discuss. For instance, what were some specific ways the king made life so "hard" that it drove the people to violence?

Raise the quality of classroom discourse. Ask questions that make students think, not regurgitate information; students will not only learn to think, but they will also learn that successful students *need* to think. Teach students to ask questions and expect them to seek clarity. Only then will they think for themselves and regulate their own learning.

In the following question sequence that we observed in a 2nd grade classroom, the teacher's questions called students' attention to their thinking:

Teacher: Jakub, Martin, and Janeen, how did you add the number?

Martin: We did it a couple ways.

Teacher: Can you explain one of your ideas?

Martin: We put the numbers into a "plus problem," making sure to keep the ones in the ones place and the tens in the tens place and then added them up ... 5 plus 5 is 10, plus 5 is 15, plus 5 is 20 ... put down the zero and carry the 2. We kept going with that way.

Teacher: That way makes good sense. Is there another way that you solved it?

Janeen: We separated the numbers into tens and fives. Then we counted by tens: 10, 20, 30, 40 and then counted by fives: 45, 50, 55, 60.

Teacher: I'll bet a lot of you came up with ideas like these. Let's talk in groups about the methods Jakub, Martin, and Janeen used and how those methods were alike and different.

Although these recommendations sound deceptively simple, it took years of practice for teachers involved in the formative assessment initiative at Armstrong to implement them skillfully and see strong results. The results were worth the effort and demonstrated that skillful formative assessment can help students drive their own learning.

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Part 6

Preparing Students
for College and
the World of Work

The Challenge of College Readiness

David T. Conley

Research shows a mismatch between high school preparation and college expectations. How can high schools prepare students for college success?

About 67 percent of U.S. students who graduated from high school in 2004 went on to enroll in college—a higher proportion than in any previous year (National Center for Education Statistics, 2005). Certainly, the rising college attendance rate is an accomplishment. But before we celebrate, we must consider how many of these hopeful, ambitious young people are likely to thrive in higher education. Here, the numbers are less encouraging. The most recent data available show that only about 35 percent of students who entered four-year colleges seeking a bachelor's degree in 1998 had earned their degree four years later, and only 56 percent had graduated six years later (Knapp, Kelly-Reid, & Whitmore, 2006).

Research suggests that one of the major reasons that students falter in college is the gap between their high school experiences and college expectations. Many first-year students find that their college courses are fundamentally different from their high school courses (Conley, Aspengren, Stout, & Veach, 2006). College instructors expect students to draw inferences, interpret results, analyze conflicting source documents, support arguments with evidence, solve complex problems that have no obvious answer, draw conclusions, offer explanations, conduct research, and generally think deeply about what they are being

taught (National Research Council, 2002). College courses also move at a faster pace, often requiring students to read eight or nine books in the same amount of time it took them to read only one in high school (Standards for Success, 2003).

According to the National Survey of Student Engagement (2006), the vast majority of first-year college students are expected to work with others in and out of class on complex problems and projects. They are expected to make presentations and explain what they have learned. College courses require students to be independent, self-reliant learners who recognize when they are having problems and know how to seek help from professors, fellow students, or other sources. In these classes, students are expected to write multiple three- to five-page papers that must be well reasoned, well organized, and well documented with evidence from credible sources.

If we contrast these common college expectations with descriptions of high school learning, we see a consistent and potentially troubling picture. Several observational studies have found that high school students often complete prescribed tasks that require little cognitive engagement. In discussions, many students consider their personal beliefs sufficient justification for their opinions and view any challenge as a personal attack. They resist solving problems with ambiguous or multiple solutions. When given two documents with conflicting conclusions, they freeze and ask which explanation is “right” instead of analyzing the texts for clues about the authors’ motivations or the historical context. For these students, learning has been reduced to a form of sleepwalking, requiring no deep mastery or understanding (Angus & Mirel, 1999; Newmann & Associates, 1996; Oakes, 2005).

Of course, these descriptions do not apply to all high school students, any more than the description of college instruction applies to every college course. However, these two sets of characterizations highlight some fundamental differences that can make the transition to college difficult for the typical high school graduate. Unless high schools address this problem, simply requiring that students take more

years of math, science, or language arts will not ensure that they are prepared for the academic demands of college.

Closing the Gap

Here are four strategies that can help high schools increase the numbers of college-ready students.

Align High School Curriculum and Instruction with College Expectations

High school leaders should begin by analyzing the content of their school's curriculum—perhaps by working in partnership with a local college, which may end up revising its own instruction as well. In addition to comparing the content of each high school course with college readiness standards and state content standards, the high school can analyze how well courses in each content area progress in difficulty level during the four years of high school.

Several groups have developed college readiness standards that are available online and could serve as a starting point for a school or district to design its own comprehensive set of standards or expectations. For example,

- The Standards for Success project, sponsored by the Association of American Universities, developed a comprehensive set of readiness standards in six subject areas (Conley, 2003). These statements of the knowledge, skills, and habits of mind necessary for success in research universities were sent to every U.S. high school in 2003 and have been licensed by the College Board as a resource to help inform the development of its assessments and programs.
- The American Diploma Project (2004) worked with postsecondary and business leaders to develop standards for the English and mathematics skills needed for college and work.

- Several states have published sets of college readiness definitions linked to state academic standards (for example, see Washington State's Transition Math Project, 2005).

Developing college readiness standards is the first step toward ensuring that the content and grading in high school courses are in sync with postsecondary expectations. Because state high school graduation standards are generally on a 10th grade level, a set of college-aligned expectations can also fill a void by helping to define the academic focus for the final two years of high school.

Develop High-Quality Syllabi in All Courses

Research suggests that the syllabi in high school courses are different from those found in college courses. High school syllabi rarely undergo external review, as all college syllabi do. The content of high school syllabi tends to be eclectic, with teachers selecting class content largely on the basis of their own interests and skills rather than on what students need to succeed in college. The format and structure may differ dramatically from teacher to teacher.

By conducting a schoolwide syllabus review and development process, high schools can address several needs. First, the process ensures that all courses have up-to-date syllabi—an important building block for quality instruction. Second, the process of developing syllabi can bring teachers together to discuss how each course fits with the other courses in a department and across departments. Finally, the process can be a powerful vehicle for reviewing how well the curriculum aligns with college expectations.

For the past several years, teachers at Burlington High School in Massachusetts have used a faculty-designed template to create Teacher Expectation Handouts. These handouts describe course content, assignments, and grading. At the beginning of the school year, every student and his or her parents receive a handout for each course the student is taking. Creating the handouts encourages teachers to work together to

develop a consistent curriculum and analyze coursework to increase rigor. One of the most important benefits has been the tremendous support from parents, who have reported enthusiastically that the handouts help them understand school expectations and support their children's learning.

Implement Senior Seminars

Keeping students fully engaged academically throughout the senior year is key to college success (National Commission on the High School Senior Year, 2001). This engagement is not easy to create, given the credit-based high school diploma and the college admission system that allows students to stockpile credits from the early years in high school. The senior seminar offers a strategy to deal with the all-important senior year.

Senior seminars can create a college-like experience in high school without teaching college-level material. These seminars can be designed for any subject area. They focus on key issues within the discipline and investigate them in depth. Elements that distinguish the senior seminar from a typical high school course include

- *Pacing.* A senior seminar introduces material at a more rapid rate than a high school course does, focusing on consolidating and deepening understanding of material to which students have already been exposed rather than introducing new material. Paradoxically, this faster pace can actually keep students more involved than the slower pace of a regular class.
- *Candid feedback.* Teachers give students honest feedback on how well their work approaches college readiness levels. College instructors are in general much more candid (and impersonal) than high school teachers are, and the senior seminar helps prepare students to interpret this type of feedback and respond to it productively.

- *Habits of mind.* The senior seminar focuses on developing the key ways of thinking that college courses emphasize—such skills as interpretation, problem solving, critical reasoning, analytic research, and accuracy.

In the past three years, the Center for Educational Policy Research at the University of Oregon has developed and designed a framework for senior seminars. Several high schools are beginning to pilot the center's seminars on such topics as alternative fuels, media and culture, and natural disasters.

For example, David Douglas High School, an urban high school in Portland, Oregon, currently offers a forensic science course incorporating the key elements of a senior seminar. Students apply acquired knowledge from biology and chemistry and use the scientific method to examine crime scenes from fictional and nonfictional texts. Students conduct lab investigations and write technical, expository, persuasive, and thesis papers throughout the course, emphasizing the credibility of referenced sources and proper scientific processes. Teacher Tara Hridel reports that students have responded positively to the increased rigor of the senior seminar, and she has noticed particular improvements in their reading comprehension, technical writing skills, and critical-analysis skills.

Add Missing Content to High School Courses

The Center for Educational Policy Research has analyzed thousands of syllabi from high schools all across the United States. These analyses reveal that much content necessary for college success is missing from high school instruction. To close the gap, high schools should weave the following important knowledge and skills into the curriculum.

In language arts, increase the amount of time that students spend expanding vocabulary and learning word analysis skills, which are the building blocks of advanced literacy. Provide instruction in strategic

reading, such as knowing when to slow down to understand key points, when to reread a passage, and how to underline strategically to highlight only the most important points in a text.

If we could institute only one change to make students more college ready, it should be to increase the amount and quality of writing students are expected to produce. Develop student writing skills systematically in all classes and across a range of writing genres, especially expository, descriptive, and persuasive writing. To increase the amount of writing that high school students do, assign many short, three- to five-page papers that require careful reasoning supported by research and citations. Expect students to edit and revise these papers rather than submit them only once.

In mathematics courses, strive to develop students' problem-solving abilities. Instead of giving students the basic solution method beforehand, ask them to determine which principles and laws might apply to a particular problem, and require that they explain and defend their solutions. Give students practice doing mathematical work correctly and precisely. Encourage them to use calculators properly and not as a replacement for thinking mathematically. For example, teach students to make reasonable estimates and to check estimates through mental math instead of always relying on a calculator. Most important, ensure that students thoroughly understand the basic concepts, principles, and techniques of algebra. Much of the subsequent mathematics they will encounter draws on these principles.

In science courses, emphasize all facets of scientific thinking. In addition to teaching the steps of the scientific method, help students understand what it means to think like a scientist—the communication conventions scientists follow, how they use empirical evidence to draw conclusions, and how they subject such conclusions to challenge and interpretation. If students are able to grasp that scientists think in terms of models and systems as ways to comprehend complex phenomena, they will have an easier time making sense of the ideas and concepts they will encounter in entry-level college courses.

In social studies, emphasize the skills of interpreting sources, evaluating evidence and competing claims, and understanding historical themes and the importance of key events. Make students aware that the social sciences consist of certain big ideas that are used to order and structure all the detail that sometimes seems overwhelming—in other words, help them build mental scaffolds that lead them toward thinking like social scientists. Students will be expected to demonstrate this kind of thinking in entry-level college courses and throughout their college program of study.

College Preparation in Action

Few high schools have successfully and intentionally implemented all the elements necessary to align their programs for college success. One public school that has implemented major changes to improve student success in college is the University Park Campus School, a small urban public school currently serving 231 predominantly low-income students in grades 7–12. The vast majority of students entering the school are at least two grade levels behind in reading and math. More than 95 percent come from families in which no one has attended college.

The University Park Campus School, Clark University, and Jobs for the Future, a Boston-based education nonprofit, have partnered to form the UPCS/Clark Institute for Student Success. Supported by the Bill and Melinda Gates Foundation, the institute enables the school to share its success and serve as a model for other small schools across the United States. The school is designed around the goal of preparing every student for college by providing a powerful, accelerated, college-preparatory curriculum. Students in grades 9–12 take all honors classes, and students in grades 7–8 participate in a curriculum designed to address significant academic and English language skill gaps.

Despite the school's high standardized test scores and college acceptance rates, the school staff found that graduates still needed additional support when they entered college. The staff redesigned

the senior year by incorporating principles of the senior seminar. They created senior classes with syllabi that have a pace, pedagogy, and assessments similar to entry-level college courses. Teachers focus on developing students' thinking skills. In addition, all seniors are required to take or audit at least one college course.

As a result of these changes and others, University Park students are experiencing increased academic success. Since the school opened in 1997, all students have passed the state's graduation examination. All members of its first three graduating classes have gone on to college, and more than 95 percent are first-generation college attenders.

In a district-level example, the Bellevue School District in Washington has designed initiatives to increase college readiness. The district established a goal of having all students complete an advanced placement course before graduation. To support this goal, the district undertook a systematic analysis of its curriculum from kindergarten through 12th grade, comparing its program with college readiness standards. Using this analysis as a starting point, the district launched an ambitious curriculum development process. It created an online site where teachers could contribute ideas and materials and exchange lesson plans. The district instructional support staff then drew from these materials and combined them with the results of the analysis to create more coherent, properly sequenced curriculum frameworks districtwide.

The district also entered into a partnership with the local community college and a research university. Representatives from each level met to develop a shared definition of the type of writing students would be expected to produce in a freshman composition course. The high school used the resulting criteria and exemplar papers to design instruction that would help students reach the levels of writing proficiency that would enable them to succeed in first-year college writing courses.

Bellevue is instituting a process to track the performance of its graduates in college. This information will consist of quantitative measures, such as course grades and course-taking patterns in the

first year of college, and more qualitative feedback from professors that provides insight into how well Bellevue students have mastered the habits of mind crucial to college success. The district will use this information to revise its curriculum and provide professional development to its teachers.

Alignment to Meet Student Needs

Remaking high school to align better with college success standards will not be easy. Some people might legitimately argue that the two systems, secondary and postsecondary, should retain their distinct characters. Some might even question whether college instructors should be telling high school teachers what to teach.

As significant as these issues are, in the final analysis, the evolving needs of students compel us to make changes in the relationship between high schools and colleges. The proportion of students going directly from secondary to postsecondary education continues to grow. More and more students and their families believe that a college education is the key to success in the new economy. To respond to students' growing expectations, secondary schools and postsecondary institutions must bring their programs into closer alignment.

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What About Those Who Don't Go?

Paul E. Barton

The current high school reform movement focuses on beefing up curriculum to raise student achievement so that more students not only get into college, but also succeed there. This goal is a worthy one for high school students who go on to college, particularly in getting them ready for the more select institutions.

But what about students who don't go to college? Only 70–80 percent of students who enter high school get a diploma.¹ Of those, about 65 percent enter college the fall after graduation, and many of them fail to get a degree (National Center for Education Statistics, 2006). Only about 4 in 10 8th graders earn a bachelor's or associate's degree (National Center for Education Statistics, n.d.).

Comprehensive reform must have as its objective equipping *all* high school students for life beyond graduation. Yet the high school reform movement has made no attempt to look at job requirements that high school graduates must meet if they do not go on to college.

In survey after survey, employers say they want employees with more than academic skills. The National Association of Manufacturers surveyed its members in 2001 and 2005, finding similar results both years. Seven out of 10 employers listed a lack of “employability skills”—such as attendance, timeliness, and a work ethic—as the top reason for turning down young applicants (National Association of Manufacturers, 2001). In a similar survey by the Conference Board and partners, the top four qualities that employers desired were a strong

work ethic, teamwork, oral communication, and ethics. Reading comprehension came next, with mathematics 14th and science 17th on the list (Casner-Lotto & Barrington, 2006). In 2006, the U.S. Chamber of Commerce created a new Work Readiness Credential (http://eff.cls.utk.edu/workreadiness/work_readiness.htm). The credential has four categories of skills: communications, interpersonal skills, decision making, and lifelong learning skills, which include taking responsibility for one's own learning and using technology.

My analysis of 13 million job openings projected by the U.S. Bureau of Labor Statistics through 2012 (Barton, 2006) and the analyses of others (Murnane & Levy, 1996) have found that in addition to these "soft skills," young job applicants need a basic 9th grade level of mathematics and reading skills to qualify for most jobs paying a middle-class wage. Employers also heavily weigh previous work experience—something a young person leaving high school may not have.

Education policymakers have a responsibility to pay attention to the kind of workforce preparation that employers value. We can prepare students for both college *and* work. Great advances have been made in integrating academics into career and technical education while keeping the option open to go to college. Arrangements that combine school with related work (such as internships, apprenticeships, and cooperative education programs) and courses in career and technical education can provide the preparation and work experience that employers want. Such programs also have the potential to reduce high school dropout rates by enabling the 20–30 percent of students who now drop out of high school to see the benefits of staying in school until graduation.

The U.S. Bureau of Labor Statistics tells us that only about 3 in 10 jobs required some form of postsecondary credential in 2004; this percentage is not expected to change substantially through 2014 (Mishel, Bernstein, & Allegretto, 2006). A one-size-fits-all high school curriculum does not fit all. We need to go back to the drawing board and redesign the whole building, not just a few rooms on the top floor.

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Endnote

¹ This range is based on a half dozen statistical series and independent research studies.

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Bringing Industry to the Classroom

Gary Hoachlander

Students shouldn't have to choose between an education that readies them for college and one that prepares them for a career. Pathways provide both.

What if vocational education turned out to be the ugly duckling of high school reform?" So asked Charles Benson nearly two decades ago, when he assumed leadership of the National Center for Research in Vocational Education at the University of California, Berkeley. Although he is no longer with us, Benson would not be surprised by one of the most remarkable, but least remarked upon, trends in U.S. high schools during the past 15 years—the continued popularity of vocational education or, as we now call it, career and technical education.

Data released last year by the U.S. Department of Education (National Center for Education Statistics, 2007) show us that in 2005, high school graduates in the United States took, on average, four Carnegie units of career and technical education (CTE)—as many or more units than in any other subject except English. During a period of unprecedented attention to raising academic achievement, with greater numbers of academic courses required for earning a high school diploma and enormous pressure on schools (and students) to meet goals of annual yearly progress on academic tests, virtually all high school students *chose* to take at least one CTE course, and more than 60 percent elected to take three or more. CTE courses are electives; few schools require students to take them.

For champions of more academics, the appeal of career and technical education may seem like bad news. But they have much to cheer about. Compared with graduates in 1990, high school graduates in 2005 took 4.3 units of English (up from 4.1); 3.8 units of mathematics (up from 3.2); 4.1 units of social studies (up from 3.5); and 3.4 units of science (up from 2.8). In short, 2005 high school graduates completed a total of 26.8 units, an increase of more than 3 units (the equivalent of one-half year of schooling!) compared with graduates in 1990.

Even more remarkable, a small but rapidly growing number of high school students have discovered what many educators and policymakers still overlook—that it is possible to prepare for both college and career simultaneously. In 2005, fully 8 percent of all high school students completed not only three or more Carnegie units of CTE but also the full complement of college-preparatory courses, including two years of foreign language. This was up from 6 percent in 2000 and up from less than 1 percent in 1990.

For the most part, this increase in the number of students concentrating in both CTE and college-preparatory academics has been happening *in spite of* high school reform—not because of it. It's time to change that, to begin fashioning new options for students that connect challenging technical courses with demanding academics. In the career and technical education field, we call these new options *multiple pathways*.

Multiple Pathways Defined

Pathways are programs of academic and technical study that integrate classroom and real-world learning organized around multiple sectors of industry—fields such as finance and business; health science and medical technology; building and environmental design; and arts, media, and entertainment. Pathways combine college-preparatory curriculums with exceptional career and technical education, motivating

students to learn by helping them answer the question, Why do I need to know this?

Organizing Principles

In high schools, pathways can take various forms and be offered through different delivery systems. But whatever their design, each pathway is grounded in four guiding principles.

- *Pathways prepare students for both postsecondary education and a career.* A pathway is always about both objectives; it's never a choice between the two. Although the Bureau of Labor Statistics projects only modest increases during the next 10 years in the number of occupations requiring a bachelor's degree (Barton, 2006; Mishel, 2007), there is consensus that career success will increasingly depend on the student taking some postsecondary education and completing a formal credential—a certificate, associate's degree, bachelor's degree, or higher credential.
- *Pathways connect academics to real-world applications.* Pathways alter *how* core academic subjects are taught; they do not lower expectations about *what* is taught. Through the pathways approach, students are expected to achieve at high levels in mathematics, science, English, social studies, and foreign language. Students master these subjects by tackling authentic problems and situations that are part of the modern workplace.
- *Pathways lead to the full range of postsecondary opportunities.* These include two- and four-year colleges, apprenticeships, formal employment training, and the military. Each pathway represents a broad industry theme that can appeal to a student regardless of his or her prior academic achievement or postsecondary aspirations. Pathways can eliminate current

practices that sort and track high school students in ways that limit their options after high school.

- *Pathways improve student achievement.* Pathways are based on accountability. They are designed to produce higher levels of accomplishment in a number of measurable arenas, including grade-level performance on tests of academic achievement, demonstrated mastery of demanding technical knowledge and skill, high school completion, postsecondary transition, and attainment of a formal postsecondary credential. Pathways also contribute—in ways that most conventional academic and CTE curriculums do not—to increased student proficiency in such vital areas as critical thinking, problem solving, media and information literacy, and collaboration. Finally, pathways make an immediate difference, helping young people gain higher earnings right after high school and giving them a leg up in the labor market while they pursue postsecondary education.

Core Components

Multiple pathways offer many strong options for students. Organized around a major industry sector, each pathway contains four essential ingredients:

- A challenging *academic component*, which typically spans multiple years and places learning in the context of real-world applications. Subjects studied include college-preparatory English, mathematics, science, and social studies.
- A demanding *technical component*, which delivers concrete industry-related knowledge and skills required for high-skill, high-wage employment.
- A *work-based learning component*, which offers students opportunities to learn through intensive internships, virtual apprenticeships, and school-based enterprises.

- *Supplemental services*, which include counseling as well as additional instruction in reading, writing, and mathematics to help students succeed with a challenging program of study.

For example, consider a pathway in Building and Environmental Design. Core academic courses systematically take advantage of the building theme to introduce authentic applications of essential academic knowledge. Geometry classes teach the concepts and skills needed to build roofs and frame walls that can withstand gale force winds. A precalculus class stresses the role of mathematics in designing and building a seismically sound bay bridge. History helps students better understand how the built environment reflects and also helps shape culture, politics, and the economy. An English class not only emphasizes the importance of mastering strong technical reading and writing, but also helps students appreciate relevant literature, such as *House*, the compelling nonfiction account of building the American dream by Pulitzer Prize winner Tracy Kidder.

Technical courses include instruction in carpentry, electricity, and masonry; but they also introduce students to fundamental principles of engineering and design, project and site planning, construction management, and emerging technologies. The work-based component connects 9th and 10th graders to mentors in such fields as architecture, construction, planning, and interior design; in 11th and 12th grade, students engage in more intensive internships, working with professionals who assess their work according to industry standards. Finally, supplemental services provide additional instruction in reading and mathematics and use industry themes to give meaning to the academic content. For example, to help students better understand the Pythagorean theorem, a supplemental mathematics class that is part of a construction technology academy may engage students in using the standard “three-four-five” triangle to ensure plumb construction of wall frames or parallel layout of flooring tile.

On-site learning is integral to the pathway approach. Seniors at Palmdale High School's Health Careers Academy in California spend two mornings each week at Kaiser Permanente learning under the supervision of their classroom teacher, who works side by side with a physician's assistant, nurse, radiology technician, or other medical professional. Students interact with real patients and learn how to conduct electrocardiograms, draw blood, interpret X-rays, set broken bones, and perform a range of other challenging tasks. Back in the classroom in the afternoon, their medical sciences class connects practical work-based experiences to in-depth study of such topics as the human cardiovascular system and the role that electricity plays in regulating the heart. Alternatively, students may dig into nuclear cardiology and the science of injecting isotopes into the blood system to assess the flow of oxygen to the heart.

Pathways in Practice

Today, multiple pathways are hardly the norm in U.S. high schools. Yet they are emerging as a fresh, comprehensive, and practical solution to the need for transforming education.

In California, the multiple-pathways approach is practiced in numerous places: at the Construction Technology Academy at Kearny High and at High Tech High School, both in San Diego; at the Health Careers Academy at Palmdale High School in Palmdale; at the Health Professions High School in Sacramento; at the Manufacturing Production Technology Academy at Laguna Creek High School in Elk Grove; at the Life Academy of Health and Bioscience in Oakland; and at the Media Academy at Grover Cleveland High School in Los Angeles.

Today in California, 296 Partnership Academies (the equivalent of career academies) are organized around the state's 15 major industry sectors; another 300 career academies are in operation. Two or more school districts often join together to create Regional Occupational Centers and Programs to offer more advanced career and technical

courses. These programs play an important part in many academies; in other high schools, they innovatively integrate academic and technical education.

For example, at the Center for Advanced Research and Technology, a regional center operated jointly by Clovis and Fresno Unified School Districts in California, 11th and 12th graders undertake projects typically involving a research paper, product development, and a final oral presentation and demonstration of their work. Last year, two students in architecture and engineering undertook an in-depth study of the history of Georgian architecture and its influence on contemporary design. A student enrolled in environmental research and technology designed and built a “fire popper,” a forest fire-fighting device that is dropped from an airplane to spread carbon dioxide foam. Still another team of students, in conjunction with their program in psychology and human behavior, developed an electronic role-playing game.

In addition, the National Academy Foundation currently serves more than 50,000 students in 41 states through 500 academies organized around finance, information technology, hospitality and tourism, and engineering. Other organizations—such as the Ford Partnership for Advanced Studies, Project Lead the Way, Acme Animation, the Big Picture Company, Talent Development High Schools, and High Schools That Work—actively support high schools seeking to better engage and teach young people through instruction that connects challenging academic and technical content.

Further supporting these new directions is the States’ Career Clusters Initiative established by the National Association of State Directors of Career and Technical Education Consortium. The consortium is working with educators and business partners to develop program specifications, curriculums, and other tools that will help states and high schools design and implement pathways in 16 major industries, including agriculture, food, and natural resources; education and training; manufacturing; and transportation, distribution, and logistics.

Most of these initiatives do not yet embrace all the organizing principles and key components of multiple pathways. Integrating academic and technical curriculums, linking classrooms to robust work-based learning, promoting project-based learning, facilitating effective team teaching among academic and CTE teachers, and engaging postsecondary faculty in the design and delivery of challenging curriculum—none of these tasks is easy, and few schools have mastered them all.

Given the difficulty, why should we persevere to make this kind of education work? Because the multiple-pathways approach offers a credible strategy for helping more young people stay engaged in high school and emerge better prepared for success in postsecondary education and careers.

The Evidence Base

Some of the most convincing evidence that a multiple-pathways strategy will improve student outcomes comes from work in cognitive science. Research concludes that many people learn better and faster, and retain information longer, when they are taught concepts in context. One particularly high-quality study (Sticht, 2002; Sticht, Armstrong, Hickey, & Caylor, 1987) found that teaching young soldiers who lacked even basic literacy skills to read in the context of their daily tasks not only increased their competency in those tasks but also improved their general reading skills—all in a relatively short time period. In fact, the gains in general reading skills were equal to or greater than those produced by the conventional literacy program; gains in job-related reading exceeded the traditional program by a factor of four or five.

Another rigorous and prominent study (Stone, Alfeld, Pearson, Lewis, & Jensen, 2006) offered strong evidence that an integrated academic and technical curriculum leads to higher test scores if implemented well. In this research, career and technical education teachers were paired with mathematics teachers who identified the mathematical content embedded in the CTE teachers' subjects—agriculture,

automotive technology, business and marketing, health, and information technology. The teacher teams then developed lesson plans to teach the math within the occupational context. Students who were taught the integrated curriculum significantly outscored the control group on two tests of math ability.

An integrated curriculum combined with work-based learning and career guidance can lead to higher wages after high school, as well as improvement in other student outcomes. For example, one of the most rigorous recent evaluations found that, five years after completing high school, males who had enrolled in career academies earned \$2,500 more than their peers annually (Kemple & Scott-Clayton, 2004).

Along similar lines, a recent examination of data from California's Partnership Academies found that academy students passed the high school exit exam at much higher rates than other high school students (Bradby, Malloy, Hanna, & Dayton, 2007). Academy students were also much more likely to complete challenging academic courses. Fifty percent of academy seniors met the minimum "A to G" course requirements—the major academic subjects that the University of California and the California State University require for admission—compared with only 37 percent of all seniors statewide.

Even without an integrated curriculum, students taking both academic and technical courses may have lower dropout rates and better achievement gains than other students. In an analysis of the National Education Longitudinal Survey, a large study monitoring student achievement data and other factors for more than a decade, researchers found that the risk of dropping out was four times higher when students took no CTE courses than when they completed a balance of CTE and academic subjects (Plank, DeLuca, & Estacion, 2005).

Finally, postsecondary participation rates may be higher for those enrolled in multiple-pathways programs. In three studies of career academies that followed students beyond high school, two found higher rates of postsecondary participation among academy students

compared with their peers, whereas one found no difference (Stern & Stearns, 2007). Research on school-to-work programs in the 1990s also frequently found high rates of postsecondary participation among graduates (Kazis, 2005).

In short, research to date suggests that multiple pathways integrating challenging academics with demanding career and technical education around major industry themes can produce many benefits for students, especially those who have not done well in conventional high school programs. Perhaps just as compelling, none of the studies indicates that students participating in pathways perform *less* well on key measures than students who elect other high school programs.

Bringing the Two Together

Often dismissed as a program for non-college-bound students and largely ignored by the champions of academic excellence in U.S. high schools, career and technical education may, ironically, hold the key to achieving gains on a wide range of student outcomes, including standard academic achievement. We will not realize this potential, however, if we continue to isolate career and technical education from challenging academic instruction. Nor are we likely to reengage many young people if we squeeze CTE out of the curriculum and promote conventional academic instruction to the exclusion of all else.

By connecting demanding technical education to challenging academics, CTE transforms both domains. Academic subjects acquire authenticity and real-world meaning; technical content becomes grounded in scholarship and intellectual rigor. Students come to understand that both are important, and they are therefore more likely to emerge from high school ready for lasting success in both college and career.

Getting Started on Multiple Pathways

Schools don't need to go it alone in designing and implementing their own industry-focused programs of study. Several resources are available:

ConnectEd: The California Center for College and Career (www.connectEdCalifornia.org). Click on "The Toolkit" for helpful resources in such areas as creating and managing career and technical education at your school, mapping and monitoring curriculum, providing professional development, and making postsecondary and industry connections. Click on "Curriculum Development" for integrated lesson units for academic teachers involved in biomedical and health sciences, engineering, and other sectors.

The Career Academy Support Network, University of California, Berkeley (<http://casn.berkeley.edu>). The *Planning Guide for Career Academies* explains how to start a career academy. It includes a schedule of tasks, roles and responsibilities of the various stakeholders, stages of evaluation, and related costs and sources of support.

The National Academy Foundation, New York City (www.naf.org). Check out NAF's *Academy Planning Guide*. The Academy Development Model can help schools decide whether to introduce or expand the NAF Academy Model in their communities.

The Ford Partnership for Advanced Studies (www.fordpas.org). Developed by Ford Motor Company Fund as part of its effort to encourage high school students to build careers in business, engineering, and technology, the Ford Partnership offers an inquiry- and project-based program that links learning in traditional academic subjects with the challenges students will face in postsecondary education and careers.

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Treat All Students Like the “Best” Students

Gene Bottoms

*The High Schools That Work model demonstrates that blending career
and college-prep education can benefit all students.*

High school leaders and teachers often lament their students’ failure to understand the value of a high school education. And they often hold the learners themselves responsible for engaging with the high school curriculum and meeting high standards. What would happen if, instead, high schools took responsibility for offering to *all* students the same challenges and opportunities that some schools now offer to only their “best” students?

The Southern Regional Education Board addressed that question when we developed the High Schools That Work model in 1987. Now operating in more than 1,200 schools in 32 states, this model offers a framework for schools to increase student engagement and prepare students for success after graduation. Guided by 10 key practices (see page 285), the model blends challenging college-preparatory content with modern vocational and technical studies.¹

To evaluate the degree to which schools in the High Schools That Work network have implemented the model, we conduct detailed student and faculty surveys in all participating schools every two years. Schools that have fully implemented the model constitute about 30 percent of participants, another 25 percent have implemented the model to a moderate degree, and the remaining 45 percent are low-

implementation sites (in many cases, because their reform efforts are still fairly new). We have found that students' perceptions of how fully their school implements the model's key practices strongly predict the school's success in raising student achievement and graduation rates.

A Rigorous Program of Studies for All

At high-implementation High Schools That Work sites, school leaders take purposeful actions to ensure that students complete a rigorous program of study. The great majority of students complete at least two of the following core academic sequences: four college-preparatory English courses with frequent reading and writing assignments; four mathematics courses beginning with Algebra I and including Geometry, Algebra II, and a more advanced course; and three lab-based, college-preparatory science courses. These schools also guide and advise their students to concentrate in a chosen academic or career/technical area. By completing this rich and challenging program of study, students prepare to pursue their career goals beyond high school.

Improved Instruction

Just enrolling students in the right courses does not ensure success, however. Effective High Schools That Work sites are characterized by a clear understanding of what it takes to teach so that students reach high standards. The entire faculty is involved in improving school and classroom practices.

For example, the science faculty at J. Sterling Morton East High School in Cicero, Illinois, agreed to reject student demographics as an excuse for low science scores. Ninety-four percent of students at Morton East are Hispanic, and 70 percent are from low-income families. Teachers received professional development from the head of the science department, the school district's curriculum director, and a High Schools That Work consultant on how to create common assignments,

units of study, labs, and assessments aligned to grade-level standards; align all science assessments to state and national standards; and create a lab manual and other resources to bring rigor and consistency to chemistry classes. The head of the science department attended a weeklong workshop, conducted by Solution Tree, on developing common assessments.

As a result of this effort, students' scores on the science portion of the American College Testing (ACT) exam rose from 16.3 in 2003 to 17.2 in 2005. Between 2004–05 and 2006–07, the school increased its number of advanced placement (AP) science sections from one to two in biology, anatomy, and physiology; from zero to two in chemistry; and from three to five in physics.

A Solid Beginning

To ensure that students leave high school prepared for postsecondary studies and a career, we must start at the beginning, easing the transition from the middle grades to high school. Successful High Schools That Work schools work with their feeder middle-grades schools to align curriculum and instruction to high school readiness standards. At these schools, 9th grade classes are smaller and are taught by teams of seasoned teachers. Freshmen who do not achieve at grade level are not allowed to fail; they receive extra help and extra time in an extended day or extended school year. Most freshmen at high-implementation schools successfully complete either Algebra I or higher mathematics and college-preparatory English/language arts, two challenging courses that provide the foundation of a solid education but are rarely offered to struggling 9th grade students at other schools.

At Corbin High School in rural eastern Kentucky, entering 9th graders study in a freshman center in a separate wing of the building, where a team of teachers helps students become familiar with the new schedule, challenging courses, and a more rapid pace of learning. Students who did not take Algebra I in 8th grade take a daily 85-minute

Algebra I class their entire freshman year. Those who completed Algebra I in the middle grades take an honors mathematics class. Corbin's graduation rate was 96 percent in 2004–05.

Connections to Adults

High-implementation High Schools That Work schools implement a guidance and advisement system focused on preparing the student for the future. Each student is connected to a caring adult mentor (teacher advisor), ideally one who shares similar experience, expertise, and hobbies. For example, a physics teacher who spends his spare time repairing motorcycle engines would be a likely mentor for students who are interested in mechanics. Schools with a growing Hispanic enrollment often place non-English-speaking students into advisory groups led by bilingual teachers.

Teacher advisors play many roles. They provide a home base for students to meet at least weekly to discuss topics ranging from setting goals and improving study skills in the 9th grade to preparing for college- and career-entry exams in the junior and senior years. They seek help for students who are struggling in a particular class.

By the end of 9th grade, most students in these schools have worked with counselors, teacher advisors, and parents to develop a challenging program of academic and career studies aligned to their post-high school goals. Students and their parents meet regularly with counselors and teacher advisors to review the plans and make adjustments. These schools also give students opportunities to look into the future by talking with professionals from postsecondary education and career fields that they may want to enter. Students can confirm that their goals are rooted in reality and based on their own aptitudes and interests.

Springdale High School in Springdale, Arkansas, created such a guidance and advisement system for its large, diverse student body. All departments and student organizations are part of the system. Each

spring, students and their parents attend school conferences to plan and review their high school programs of study. The conferences attract more than 98 percent of parents. Springdale attributes students' high-level course-taking patterns and the school's high graduation rate to teacher advisors who recommend rigorous courses and to parents who sign off on choices supporting their children in achieving success.

High-Quality Math and Science Instruction

Successful High Schools That Work sites place a great deal of emphasis on improving the quality of mathematics and science instruction. Teachers offer student-centered, research-based instruction designed to prepare students for a complex, technology-based world. In mathematics courses, students apply mathematics concepts to solve authentic problems that have meaning in their lives. Science labs focus on essential questions that are important in career fields or the community. Science projects require students to design experiments around essential questions; conduct experiments; and analyze, write, and present their findings. Students often work in study teams.

Science teachers at Lee's Summit High School in Lee's Summit, Missouri, developed activities and labs designed to hold students' interest while improving critical-thinking skills. For example, to prepare for a research project on the digestive system, science students study the organs of the digestive system and the various enzymes and chemicals produced by the system. They examine several essential questions: Why is a good diet essential to good health? Why are certain foods detrimental to one's health? Why is it important to modify a diet if certain medical conditions are present? and How can these modifications be made? The students also conduct chemical tests designed to identify the presence of sugars, polysaccharides, proteins, and fats in food.

For their research project, students are grouped into teams. Each team is assigned a set of patient symptoms related to a digestive condition. Acting as diagnosticians, each team must relate the symptoms

to certain organs of the digestive system, justify this relationship, and specify the conditions that gave rise to the symptoms. Then, acting as physicians, they prescribe remedies for the condition, including diet adjustments. Any remedy must be justified by the evidence (symptoms) and the team's knowledge of the digestive system. Each team presents its project to the class as if in a clinical situation. Class members assume the roles of fellow medical specialists to critically review what each team has done.

Reading and Writing Across the Curriculum

Educators at the most successful High Schools That Work sites make reading and writing for learning the norm in most courses. A schoolwide literacy effort improves student achievement and prepares graduates to read, write, and speak coherently, whether their next step is college or a job. Students at these schools read the equivalent of 15 to 25 books each year across the curriculum, do independent research, and write papers on their findings in all classes.

For example, at Owen Valley High School in Spencer, Indiana, teachers participate in professional development to learn how to incorporate literacy into every academic and career/technical subject. Increasingly, they are moving away from using fact-recall tests in favor of essays and performance-based assessments. As a result, the percentage of students meeting High Schools That Work college and career readiness goals in reading increased from 61 percent in 2004 to 69 percent in 2006.

High Standards for Career/Technical Studies

At high-implementation High Schools That Work schools, career/technical studies teachers typically meet regularly with academic teachers to increase the amount of reading, writing, mathematics, and science

woven into the career/technical content. Many of the schools require a senior project involving research, a product, and a presentation.

All career/technical course activities focus on how knowledge and skills are used in an actual career setting. Students meet professionals from a variety of fields and have work-based mentors introduce them to the real-world environment of a job. Some schools organize students into small learning communities or academies where academic and career/technical teachers work together to relate high school studies to the world beyond the school. Many students blossom as they build confidence and experience success in a chosen career field.

Caddo Career and Technology Center in Shreveport, Louisiana, offers career/technical programs grouped into four broad categories: Arts and Humanities (for example, commercial art and fashion design); Health and Human Services (for example, nursing and culinary arts); Business and Marketing (for example, office administration and accounting); and Engineering and Industrial Technologies (for example, carpentry and electronics). The center has aligned its career/technical programs to industry standards so that students are ready to move into the workplace and pursue further study after graduation. As a consequence, the percentages of students meeting college and career readiness standards in reading and mathematics increased significantly in 2006.

The alignment process used by Caddo carpentry instructors is typical. The instructors determined the knowledge and skills students needed to earn certification from the National Center for Construction Education and Research (NCCER). They compared these requirements with their current curriculum, teacher assignments, and classroom assessments, and revised the program to give more emphasis to the skills students are expected to demonstrate to earn the industry-based certification. For example, they found that students had adequate mathematics skills but could not apply mathematics concepts to construction-related problems. In response, teachers began to place more emphasis on real-life applications of algebra and geometry in the

construction field. Teachers also required students to read construction-related articles and materials weekly and take notes in pairs on what they read. This increased their understanding of materials and advanced their fluency with the language of the construction field. Carpentry teachers regularly review how program graduates score on the NCCER certification exam and determine further changes needed in the program.

Caddo students benefit from challenging assignments that require the application of academic and technical content. For example, carpentry students may design and build a storage building for a customer in the community. Using a computer-assisted drafting and design program to create the blueprint for the project, students learn the basics of ratio and proportion. They use area and perimeter formulas to calculate the amount of materials needed and limit waste. Working with rafters, trusses, and gable ends requires basic geometry, such as right triangle properties and the Pythagorean theorem, to calculate angles, lengths, and areas. Students must be able to read technical materials on how to complete the project; use equations to determine the amount, type, and cost of materials; and put totals on a computer-generated spreadsheet. In addition, students must estimate the time needed for the project and its projected cost.

Extra Support When Needed

High-implementation high schools commonly have credit-recovery programs to help all students graduate on time. Credit-recovery programs give struggling students a second chance to master material in a course they are failing. These programs are based on demonstrated mastery of the essential standards rather than the amount of time students spend on the standards.

For example, Oak Glen High School in rural West Virginia created an educational opportunities period once a week during the regular school day, during which teachers tutor small groups of students who

need assistance. Students identified for credit recovery sign a contract to diligently pursue their studies and participate in tutoring until they meet course standards. As a result of these efforts, the school’s graduation rate reached 90 percent in 2004–05, and the percentage of seniors planning to pursue postsecondary studies increased to 90 percent in 2006.

Optimal Use of Senior Year

Most High Schools That Work sites use the senior year to prepare students for college and careers. No time or effort is wasted. Students entering the 12th grade generally fall into one of three groups:

- *Seniors who meet college readiness standards* take AP or dual-credit courses. It is not unusual to find 50 percent of seniors at high-performing schools enrolled in courses where they are earning postsecondary credits. Many students have already met the placement requirements for the colleges they plan to attend.
- *Seniors who plan to enter college but have academic deficiencies, most often in mathematics*, may take a special course emphasizing the concepts needed to pass a placement exam.
- *Seniors who plan to work rather than enter college immediately after graduation* work toward certificates verifying that they have attained the knowledge and skills necessary for employment in their fields of interest. If the high school cannot provide career/technical instruction in a student’s chosen field, it may work with a nearby technical center, community college, or apprenticeship program to provide such instruction and certification.

Results: Better-Prepared Graduates

Graduates from effective High Schools That Work schools are strikingly different from the majority of U.S. high school graduates in three significant ways:

- *They are more likely to have finished high school on time.* Students do not flounder as high school freshmen because they receive the intensive instructional time and support they need to succeed in 9th grade and complete high school in four years. In Georgia's 46 high-implementation High Schools That Work sites, the median high school completion rate is 75 percent, compared with a median of 63 percent in low-implementation High Schools That Work sites.
- *They are more likely to continue their studies after high school.* In 2006, high-implementation High Schools That Work sites reported that a median of 85 percent of their graduates were planning to engage in further study; this contrasts with a median of 73 percent at low-implementation schools with comparable students.
- *They are better prepared to succeed in college and work.* More than 90 percent of students who complete High Schools That Work–recommended coursework at high-implementation schools enter college. Fewer than 11 percent of these students need to take a remedial course, and more than 90 percent return for the second year. Many graduates who enter the workplace have earned employer certifications demonstrating they are equipped for a career. More than 80 percent find a job during high school or in the summer after graduation. One year later, 95 percent of these graduates are still employed in the same job, with an average wage of \$9.80 per hour.²

Rigor and Relevance

Some people argue that making high schools more rigorous may prompt at-risk students to drop out before graduating. The opposite is true. As High Schools That Work sites add rigor and relevance to the curriculum, more students believe that their studies are worthwhile and linked to their future success. Students are better prepared, not just in academic and technical knowledge and skills, but also in such intangible assets as time-management skills, relationship-building skills, and the ability to work hard to achieve their goals. More graduates enter postsecondary education with a purpose and a focus for their studies.

These schools demonstrate that it is possible for high schools with diverse populations to graduate students who are ready for continuing education and good careers. But to achieve this goal, teachers and school leaders must accept responsibility for providing learning experiences that students see as important to their futures.

High Schools That Work: Key Practices

High expectations and frequent feedback integrated into classroom practices.

A rigorous program of study that includes an upgraded academic core and a concentration.

Academic studies that encourage students to apply academic content and skills to real-world problems.

Intellectually challenging career/technical studies in high-demand fields that emphasize mathematics, science, literacy, and problem solving.

Work-based learning planned by educators, employers, and students.

Teachers working together in interdisciplinary teams to integrate reading, writing, and speaking into all parts of the curriculum and to integrate mathematics into science and career/technical classrooms.

Students actively engaged in assignments through research-based instructional strategies and technology.

A guidance and advisement system that provides each student with the same mentor throughout high school and ensures completion of an accelerated program of study with an academic or career/technical concentration.

A structured system of extra help to assist students who need it.

A culture of continuous improvement based on student assessment and program evaluation data.

Source: Southern Regional Education Board. Available: www.sreb.org/programs/hstw/background/keypractices.asp

Endnotes

¹ To join the High Schools That Work network, schools must agree to participate in the High Schools That Work assessment, staff development, technical assistance, and networking activities designed to advance whole-school improvement. In the 32 states that have joined the network, schools may participate by applying to their state department of education's career/technical division. In nonparticipating states, schools can contract with the Southern Regional Education Board (SREB) to receive site-specific services, which include a visit to the school by a team of experts; the High Schools That Work assessments in reading, mathematics, and science; a workshop on the High Schools That Work Goals and Key Practices; site-specific staff development; and coaching. To learn more about joining the network, see www.sreb.org/programs/hstw/becoming/becomingindex.asp

² Bottoms, G., Young, M., & Uhn, J. (2006). *High Schools That Work follow-up study of 2004 high school graduates: Transitioning to college and careers from a High Schools That Work high school*. Atlanta, GA: Southern Regional Education Board.

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Creating Global Classrooms

Willona M. Sloan

Around the world, teachers are using online education tools to bring a global perspective to the classroom.

To compete in the constantly evolving global marketplace, businesses around the world use Web sites, podcasts, blogs, videos, interactive forums, and other digital tools to connect with their customers, expand their international presence, and foster partnerships across borders. In the 21st century, “business as usual” just doesn’t cut it anymore. Now, too, many educators are starting to catch on to the 21st century way of doing things. Using the same innovative digital tools as industry leaders, educators around the globe are developing cross-cultural education projects to bring the knowledge, resources, and diverse cultures of the world into their classrooms. From the remotest villages to the densest urban centers, students are communicating, collaborating, and learning in new and exciting ways.

When teachers develop international projects using online resources to connect classrooms, these experiences can give students a chance to learn 21st century skills such as ICT (information and communication technologies) literacy, creativity, critical thinking, and civic literacy while also developing a deeper understanding of the world and their place in it.

Using portals such as the International Education and Resource Network (iEARN) and ePals, teachers can connect with other educators in almost any country to develop activities ranging from collaborative

science experiments to natural disaster preparation projects to fun cultural informational exchanges.

Starting a Learning Revolution

Internationalizing classrooms through online educational collaborations can have numerous tangible and intangible benefits for students. These types of projects can help students develop technical competencies in different forms of digital media including video equipment, digital cameras, audio recorders, and computer software. Also, students can improve their literacy skills by reading and writing e-mail, blogs, and other communications.

Students also learn from each other as they share experiences; discuss their lives, families, and communities; and give feedback on one another's academic work. Educators using technology to bring the global perspective to their lessons are truly opening the door to the universe of knowledge.

Research shows that to be successful in the 21st century, young people will need the type of skills training and socialization that online cross-cultural education projects can provide. In addition to technology skills, young people also must learn 21st century skills such as working collaboratively with people of diverse cultures, religions, and backgrounds; thinking critically; and solving problems. In the 2006 presentation *The Old and the New: A Learning Revolution* for the William and Flora Hewlett Foundation, Marshall S. Smith, Phoenix M. Wang, and Catherine M. Casserly urged educators to move beyond teaching reading, writing, and arithmetic to prepare young people for the competitive global marketplace. "Every nation will need far more workers who are able to take responsibility, work cooperatively, grapple with uncertainty, [and] behave creatively," they said.

Just as the skills students need are changing, so are the ways they acquire this knowledge. By using technology, regardless of their location, students can have access to a vast array of educational resources

at all times. Smith, Wang, and Casserly explained that technology can enhance the learning experience by providing open access to educational resources such as online library collections, books, videos, translators, and other resources. The world is literally available at students' fingertips.

Students feel motivated by learning-by-doing when they use technology to develop strategies, solve problems, and participate in interactive projects with other students.

Not only do they need to acquire 21st century skills, but when they do it in an exciting environment, they just might actually enjoy it!

Globally Competent Graduates

Twenty-first century success will require students to think, act, and perform differently than previous generations. Heather Singmaster, senior program associate at the Asia Society, thinks that's a good thing.

"The world in which today's students will graduate is far different than the world in which we grew up," says Singmaster. The Asia Society supports educational practices designed to develop "globally competent graduates" who possess "knowledge of other world regions, cultures, economies, and global/international issues; critical-thinking skills and the ability to apply them flexibly to world problems and scientific challenges; communication skills, including skills in communicating in languages other than English, working in cross-cultural environments, and using information from different sources around the world; and values of respect for other cultures and of civic engagement," says Singmaster.

The Asia Society recently created the Partnership for Global Learning, which is a network of schools, education leaders, and policy-makers committed to "moving international education from the margins to the mainstream of American education." This network, Singmaster says, connects state and district decision makers, school leaders, teachers, university leaders, and other stakeholders to build the capacity of

K–12 educators to develop “college-ready, globally competent youth by integrating knowledge and skills throughout the curriculum and to foster policies and resources at the national and state level to encourage global learning.”

Teachers can’t create globally competent graduates in isolation. They must reach out to other teachers, tap into international resources, and create partnerships to enhance student learning.

Connecting with iEARN

In its 20-year history, the K–12 network iEARN (www.iearn.org) has connected more than 2 million students and close to 26,000 educators in 125 countries. iEARN is something of a meeting place where teachers can develop projects based on their content areas, interests, and grade levels. Teachers design their own projects, curriculum, and rubrics according to their agreed-upon goals and objectives.

The iEARN projects can be classroom to classroom, or they can involve multiple classes or schools. At the conclusion of each project, participants must create some type of exhibition such as a Web site, publication, blog, art show, or video, explaining how the project influenced student learning.

Using the network, educators are not constricted by geographical boundaries or political or cultural barriers. Teachers can offer their students a chance to experience life in a totally different world.

In 1988, iEARN developed a project linking 12 schools throughout the state of New York with 12 schools in Moscow. Despite chilly relations between the two countries during the Cold War, the students communicated via e-mail, lumaphones (video speaker telephones), and student and teacher exchanges and shared an important educational experience that benefited students, teachers, and school leaders.

Alla Shushkovskaya, principal of a participating school in Moscow, wrote about the pioneering project in *iEARN Interaction*. Shushkovskaya explains that his school partnered with a New York high

school on a variety of ecology, history, language, and sports projects. Politics aside, the students were able to see their shared bonds.

“Historically, that period was very difficult in our country,” says Shushkovskaya. “This project helped our students and teachers to open the door to the international society and to perceive themselves not only as citizens of the country, but also citizens of the world.” Today, Shushkovskaya’s school continues to collaborate on international education projects, and his students are participating in projects with students in Japan, Great Britain, Canada, Italy, and the United States.

Ed Gragert, executive director of iEARN-USA, says projects such as the first momentous U.S.S.R.–U.S. exchange can greatly enhance the academic experience by engaging students. Students feel more motivated to learn when communicating with other young people because the authentic experience allows them to take ownership of their learning, says Gragert.

These projects also “put [lessons] in a real context, in a global context,” says Gragert. “A lot of students don’t understand why they are learning something because they don’t immediately use it. When they are engaged with other students, and they see other students showing an interest in what they are studying—they are more willing to go to the next [level]. Students are then taken into directions the teachers didn’t anticipate.”

Students may do lessons—such as conducting a scientific experiment or writing a poem—and post them online and receive feedback from students in the other classroom, explains Gragert. “They get feedback from an authentic audience of their peers who are commenting on [their work]. That sort of student-to-student dialogue [doesn’t always happen in a traditional classroom]. Sometimes they don’t even realize they’re learning, and they don’t realize they’re getting the cross-cultural piece. It’s direct learning *with* someone instead of *about* them.”

Teacher collaboration is really the key to success for these international educational partnerships, notes Gragert. Through iEARN’s interactive forums, workshops, and conferences, teachers can ask

questions, share ideas, and discuss what works and doesn't work to continually improve their partnerships. "Teachers learn from other teachers," says Gragert. "They want to hear what it was really like doing it in the classroom from another teacher."

Mapping a Global Solution

Around the world, learning and teaching is evolving as classroom educators prepare their students to be globally competent citizens of the 21st century. Yoko Takagi, the country coordinator for Japan iEARN (also known as JEARN), says online education projects have numerous educational benefits, including giving students in even the most isolated areas access to new experiences and knowledge.

"Technology is an instant tool to provide students the new 21st learning environment in the classroom. It doesn't matter if the schools are located in a small island or in remote mountain areas once they have access to the Internet. They all enjoy the same quality of education when we compare them with larger schools that are highly technically armed in bigger [internationally recognized] cities."

Takagi explains that through online forums, videoconferences, Web sites, and other media, students can meet "co-learners" to "build and grow human relationships." This type of interaction helps students to "find value and respect for others, and find their own value and respect for themselves," she says.

One JEARN project bringing kids together from all over the world is the Natural Disaster Youth Summit (NDYS). The online collaboration was started after the Natural Disaster Youth Summit in 2005, which gathered Japanese youth affected by the 1995 Hanshin Awaji earthquake as well as children who had experienced natural disasters in their countries, to promote awareness about natural disasters around the world. NDYS now includes participating students from 21 countries, including Australia, Cuba, Iran, Nigeria, and Papua New Guinea.

Each class creates a disaster safety map charting the areas surrounding their schools, with the goal of creating a global disaster map when all the schools participate. The Global Disaster Safety Map Project (<http://ndys.jearn.jp/GDSM.htm>) teaches students to think about the safety of their local communities; identify potential disasters; and discuss disaster management solutions.

After conducting research about past natural disasters in their communities and analyzing local disaster recovery plans, students develop a map of the area surrounding their schools, identifying local urban areas and mountain and flatland areas; waterways; transportation routes; open spaces; government institutions; medical facilities; disaster relief areas; fire departments; police stations; schools; public facilities; hazardous areas; and evacuation points, among other items. On the basis of this information, students design an evacuation plan and identify potential risks and problems.

Students share their research through the NDYS Web site, blog, listservers, and other interactive tools. Some classes have even participated in videoconferencing, allowing students to discuss their projects face-to-face. NDYS includes a separate forum for teachers to share ideas.

International projects like NDYS that encourage students to work collaboratively, share information, and solve critical problems together can revolutionize the way we interact on a global scale. “Communication with patience and in a respectful manner with [people of] different cultures is the only way to solve our troubles and create a better world,” says Takagi.

ePals’ Blogging Buddies

Another popular platform for e-learning is ePals (www.epals.com), which connects students and teachers in approximately 200 countries and territories. Users have access to a secure e-mail system and online forum, and students can create their own blogs.

David Huffaker's study *Let Them Blog: Using Weblogs to Advance Literacy in the K-12 Classroom* extols the benefits of student blogging. He argues that blogging helps students gain valuable 21st century skills such as digital literacy, promotes verbal and visual literacy, provides a space for students to engage in storytelling, and allows students to interact with students in their own age and developmental groups.

Huffaker says blogs help "create a community of practice among participating students. They can collaborate with each other and build knowledge. These types of discussions, where ideas are synthesized and new ideas created, may be intrinsic to building critical-thinking skills. They may also feel that they are 'part of a team' and that each individual has a responsibility to contribute in order to achieve success for the group," says Huffaker.

At Patrick Henry High School in San Diego, Calif., Candace Pauchnick, a human psychology and sociology teacher, uses ePals to connect her students with Professor Chen Yaodong's students at China's Guangxi Polytechnic University. Both groups of young people post blog entries, in addition to exchanging e-mail and doing videoconferences.

Through their blog entries, the students engage in discussions about culture, politics, stereotypes, interests, and whatever else comes to mind. Pauchnick and Chen facilitate the process by encouraging ePals users to add to their list of suggestions for students' blog topics. Suggested topics include issues of gender equality in each country; the recent earthquake in China and its effects on the Chinese students and their communities; fast food and obesity; and the Olympics. The students post comments, providing their own unique perspectives on the different issues.

Pauchnick says her students feel motivated to learn when blogging and interacting with their new Chinese friends. "I see them motivated to learn when they connect to [their] ePals," says Pauchnick, who conducted a study comparing students in her classes where she used ePals to classes where she did not. "I noticed that the students who did not have the ePals did the research on China with less enthusiasm than

those who were connected to an ePal. Students with ePals had much more interest in class discussions because they could share items they learned from their letters. My shy students would talk more, too. The lessons were 'real-to-life' and my students could feel more connected to what they were learning," she says.

In addition to being more motivated, the students benefited academically because the extra reading and writing enhanced their literacy skills. "Another bonus is that my students were more motivated to write, and they had to write correctly so their ePals could understand what they were saying. Since the Chinese students were learning English, it motivated my students to write as [well] as possible. This was sometimes a challenge since I also have students who are learning English," says Pauchnick.

Pauchnick also saw that her students developed a very real sense of compassion for their Chinese partners. "When the earthquake hit in China last year, my students were genuinely concerned for their ePals," she says.

Pauchnick and Chen also regularly post blog entries to discuss the exchange with interested educators and to gather new ideas and suggestions from other teachers. Pauchnick recommends this type of online educational resource for teachers looking to internationalize their classrooms and differentiate instruction: "All the various projects the ePal program offers [help] teachers from all over the world to find areas that meet individual needs," she says.

Speaking at the 2006 Future in Review conference, Pauchnick explained how using technology to create cultural connections through project-based learning changed everything for her students and for herself. "It's essential to have technology in the classroom. My students are addicted to technology. In fact, they spend between 30 minutes and three hours a day on their blog pages. I see this addiction as the catalyst to educational improvement," said Pauchnick. "I can tell you from first-hand experience, collaborative project-based learning is gripping the

nation, and education, because it does enhance learning and students are much more engaged.”

This is a new era for education. Just as businesses are changing the way they operate in a global environment, so are schools. “Our industry is rapidly changing,” said Pauchnick at the Future in Review conference. “I see the future with the traditional textbooks all going online or on CDs with companion Web sites . . . I see the future of education with schools becoming hybrids: blending online technology with socialization in community schools but connecting with schools all over the world.”

Four Rivers, One World

In New York, Christine Kola works with 8th graders in an after-school program as part of the Four Rivers, One World project, which brings together Kola's students with young people in Bangladesh, India, and Nepal. In 2008, Kola joined the project after meeting Geetanjali Bodhankar, who is a 9th standard (U.S. 9th grade) teacher in Pune, India.

iEARN-Bangladesh, iEARN-India, iEARN-Nepal, and iEARN-USA are collaborating with the Center for Innovation in Engineering and Science Education (CIESE) at Stevens Institute of Technology in New Jersey, and the Waterkeeper Alliance in New York City. The project also receives support from the U.S. Department of State's Bureau of Education and Cultural Affairs.

Through videoconferences and the Four Rivers, One World online forum, the teachers planned the project, tapped experts, and assembled volunteers. Now, each of the four groups conducts water-analysis experiments in a local river, with the intention of using their findings to make recommendations about how to protect the rivers in their communities.

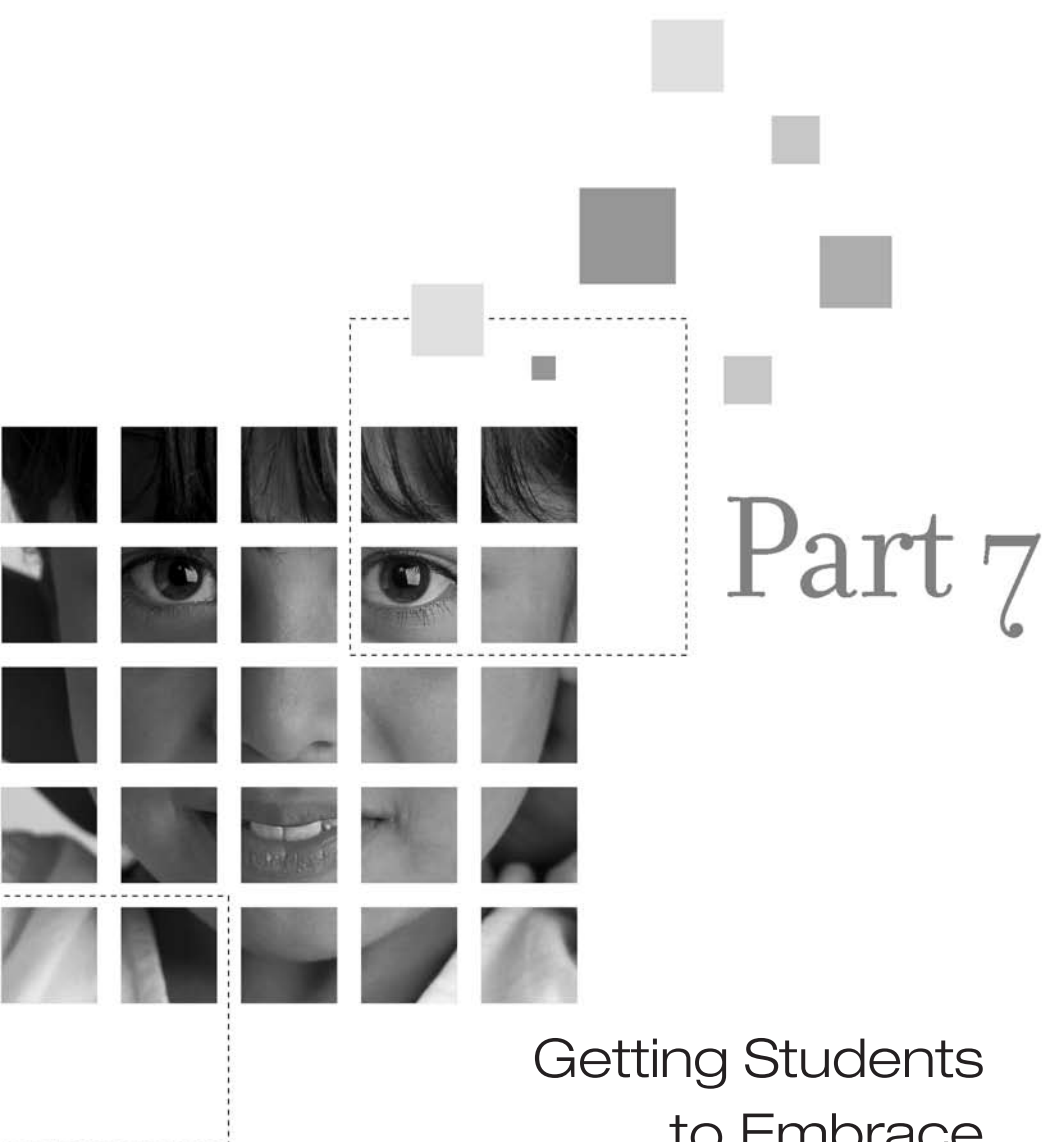
Kola's students test and analyze water samples from the nearby Bronx River. The students are testing for nitrates, phosphates, pH, dissolved oxygen, and turbidity, explains Kola. They share their results with the other participating classes and compare data.

Kola recently visited India, where she spoke with Bodhankar's students. Both teachers encourage their students to e-mail regularly to share information about both the project and their lives. Kola says she can see the effect the cross-cultural partnership has had on her students' understanding of their ability to be change agents in a global society.

"My students are learning about the environment and how essential it is to protect our most important natural resource. However, they are also thinking more globally and not just [of] their immediate surroundings," says Kola. "All of my students have volunteered to do this; it is not part of their grade. They are acquiring knowledge of environmental situations and discovering that their opinion counts. They are realizing that everyday citizens can protect and help the environment."

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Part 7

Getting Students
to Embrace
Challenge

The Perils and Promises of Praise

Carol S. Dweck

The wrong kind of praise creates self-defeating behavior.

The right kind motivates students to learn.

We often hear these days that we've produced a generation of young people who can't get through the day without an award. They expect success because they're special, not because they've worked hard.

Is this true? Have we inadvertently done something to hold back our students?

I think educators commonly hold two beliefs that do just that. Many believe that (1) praising students' intelligence builds their confidence and motivation to learn, and (2) students' inherent intelligence is the major cause of their achievement in school. Our research has shown that the first belief is false and that the second can be harmful—even for the most competent students.

As a psychologist, I have studied student motivation for more than 35 years. My graduate students and I have looked at thousands of children, asking why some enjoy learning, even when it's hard, and why they are resilient in the face of obstacles. We have learned a great deal. Research shows us how to praise students in ways that yield motivation and resilience. In addition, specific interventions can reverse a student's slide into failure during the vulnerable period of adolescence.

Fixed or Malleable?

Praise is intricately connected to how students view their intelligence. Some students believe that their intellectual ability is a fixed trait. They have a certain amount of intelligence, and that's that. Students with this fixed mind-set become excessively concerned with how smart they are, seeking tasks that will prove their intelligence and avoiding ones that might not (Dweck, 1999, 2006). The desire to learn takes a backseat.

Other students believe that their intellectual ability is something they can develop through effort and education. They don't necessarily believe that anyone can become an Einstein or a Mozart, but they do understand that even Einstein and Mozart had to put in years of effort to become who they were. When students believe that they can develop their intelligence, they focus on doing just that. Not worrying about how smart they will appear, they take on challenges and stick to them (Dweck, 1999, 2006).

More and more research in psychology and neuroscience supports the growth mind-set. We are discovering that the brain has more plasticity over time than we ever imagined (Doidge, 2007); that fundamental aspects of intelligence can be enhanced through learning (Sternberg, 2005); and that dedication and persistence in the face of obstacles are key ingredients in outstanding achievement (Ericsson, Charness, Feltovich, & Hoffman, 2006).

Alfred Binet (1909/1973), the inventor of the IQ test, had a strong growth mind-set. He believed that education could transform the basic capacity to learn. Far from intending to measure fixed intelligence, he meant his test to be a tool for identifying students who were not profiting from the public school curriculum so that other courses of study could be devised to foster their intellectual growth.

The Two Faces of Effort

The fixed and growth mind-sets create two different psychological worlds. In the fixed mind-set, students care first and foremost about how they'll be judged: smart or not smart. Repeatedly, students with this mind-set reject opportunities to learn if they might make mistakes (Hong, Chiu, Dweck, Lin, & Wan, 1999; Mueller & Dweck, 1998). When they do make mistakes or reveal deficiencies, rather than correct them, they try to hide them (Nussbaum & Dweck, 2007).

They are also afraid of effort because effort makes them feel dumb. They believe that if you have the ability, you shouldn't need effort (Blackwell, Trzesniewski, & Dweck, 2007), that ability should bring success all by itself. This is one of the worst beliefs that students can hold. It can cause many bright students to stop working in school when the curriculum becomes challenging.

Finally, students in the fixed mind-set don't recover well from setbacks. When they hit a setback in school, they *decrease* their efforts and consider cheating (Blackwell et al., 2007). The idea of fixed intelligence does not offer them viable ways to improve.

Let's get inside the head of a student with a fixed mind-set as he sits in his classroom, confronted with algebra for the first time. Up until then, he has breezed through math. Even when he barely paid attention in class and skimmed on his homework, he always got As. But this is different. It's hard. The student feels anxious and thinks, "What if I'm not as good at math as I thought? What if other kids understand it and I don't?" At some level, he realizes that he has two choices: try hard, or turn off. His interest in math begins to wane, and his attention wanders. He tells himself, "Who cares about this stuff? It's for nerds. I could do it if I wanted to, but it's so boring. You don't see CEOs and sports stars solving for x and y ."

By contrast, in the growth mind-set, students care about learning. When they make a mistake or exhibit a deficiency, they correct it (Blackwell et al., 2007; Nussbaum & Dweck, 2007). For them, effort is a *positive* thing: It ignites their intelligence and causes it to grow. In the face of failure, these students escalate their efforts and look for new learning strategies.

Let's look at another student—one who has a growth mind-set—having her first encounter with algebra. She finds it new, hard, and confusing, unlike anything else she has ever learned. But she's determined to understand it. She listens to everything the teacher says, asks the teacher questions after class, and takes her textbook home and reads the chapter over twice. As she begins to get it, she feels exhilarated. A new world of math opens up for her.

It is not surprising, then, that when we have followed students over challenging school transitions or courses, we find that those with growth mind-sets outperform their classmates with fixed mind-sets—even when they entered with equal skills and knowledge. A growth mind-set fosters the growth of ability over time (Blackwell et al., 2007; Mangels, Butterfield, Lamb, Good, & Dweck, 2006; see also Grant & Dweck, 2003).

The Effects of Praise

Many educators have hoped to maximize students' confidence in their abilities, their enjoyment of learning, and their ability to thrive in school by praising their intelligence. We've studied the effects of this kind of praise in children as young as 4 years old and as old as adolescence, in students in inner-city and rural settings, and in students of different ethnicities—and we've consistently found the same thing (Cimpian, Arce, Markman, & Dweck, 2007; Kamins & Dweck, 1999; Mueller & Dweck, 1998): Praising students' intelligence gives them a short burst of pride, followed by a long string of negative consequences.

In many of our studies (see Mueller & Dweck, 1998), 5th grade students worked on a task, and after the first set of problems, the teacher praised some of them for their intelligence (“You must be smart at these problems”) and others for their effort (“You must have worked hard at these problems”). We then assessed the students’ mind-sets. In one study, we asked students to agree or disagree with mind-set statements, such as, “Your intelligence is something basic about you that you can’t really change.” Students praised for intelligence agreed with statements like these more than students praised for effort did. In another study, we asked students to define intelligence. Students praised for intelligence made significantly more references to innate, fixed capacity, whereas the students praised for effort made more references to skills, knowledge, and areas they could change through effort and learning. Thus, we found that praise for intelligence tended to put students in a fixed mind-set (intelligence is fixed, and you have it), whereas praise for effort tended to put them in a growth mind-set (you’re developing these skills because you’re working hard).

We then offered students a chance to work on either a challenging task that they could learn from or an easy one that ensured error-free performance. Most of those praised for intelligence wanted the easy task, whereas most of those praised for effort wanted the challenging task and the opportunity to learn.

Next, the students worked on some challenging problems. As a group, students who had been praised for their intelligence *lost* their confidence in their ability and their enjoyment of the task as soon as they began to struggle with the problem. If success meant they were smart, then struggling meant they were not. The whole point of intelligence praise is to boost confidence and motivation, but both were gone in a flash. Only the effort-praised kids remained, on the whole, confident and eager.

When the problems were made somewhat easier again, students praised for intelligence did poorly, having lost their confidence and motivation. As a group, they did worse than they had done initially on

these same types of problems. The students praised for effort showed excellent performance and continued to improve.

Finally, when asked to report their scores (anonymously), almost 40 percent of the intelligence-praised students lied. Apparently, their egos were so wrapped up in their performance that they couldn't admit mistakes. Only about 10 percent of the effort-praised students saw fit to falsify their results.

Praising students for their intelligence, then, hands them not motivation and resilience but a fixed mind-set with all its vulnerability. In contrast, effort or "process" praise (praise for engagement, perseverance, strategies, improvement, and the like) fosters hardy motivation. It tells students what they've done to be successful and what they need to do to be successful again in the future. Process praise sounds like this:

- You really studied for your English test, and your improvement shows it. You read the material over several times, outlined it, and tested yourself on it. That really worked!
- I like the way you tried all kinds of strategies on that math problem until you finally got it.
- It was a long, hard assignment, but you stuck to it and got it done. You stayed at your desk, kept up your concentration, and kept working. That's great!
- I like that you took on that challenging project for your science class. It will take a lot of work—doing the research, designing the machine, buying the parts, and building it. You're going to learn a lot of great things.

What about a student who gets an *A* without trying? I would say, "All right, that was too easy for you. Let's do something more challenging that you can learn from." We don't want to make something done quickly and easily the basis for our admiration.

What about a student who works hard and *doesn't* do well? I would say, "I liked the effort you put in. Let's work together some

more and figure out what you don't understand." Process praise keeps students focused, not on something called ability that they may or may not have and that magically creates success or failure, but on processes they can all engage in to learn.

Motivated to Learn

Finding that a growth mind-set creates motivation and resilience—and leads to higher achievement—we sought to develop an intervention that would teach this mind-set to students. We decided to aim our intervention at students who were making the transition to 7th grade because this is a time of great vulnerability. School often gets more difficult in 7th grade, grading becomes more stringent, and the environment becomes more impersonal. Many students take stock of themselves and their intellectual abilities at this time and decide whether they want to be involved with school. Not surprisingly, it is often a time of disengagement and plunging achievement.

We performed our intervention in a New York City junior high school in which many students were struggling with the transition and were showing plummeting grades. If students learned a growth mind-set, we reasoned, they might be able to meet this challenge with increased, rather than decreased, effort. We therefore developed an eight-session workshop in which both the control group and the growth-mind-set group learned study skills, time management techniques, and memory strategies (Blackwell et al., 2007). However, in the growth-mind-set intervention, students also learned about their brains and what they could do to make their intelligence grow.

They learned that the brain is like a muscle—the more they exercise it, the stronger it becomes. They learned that every time they try hard and learn something new, their brain forms new connections that, over time, make them smarter. They learned that intellectual development is not the natural unfolding of intelligence, but rather the formation of new connections brought about through effort and learning.

Students were riveted by this information. The idea that their intellectual growth was largely in their hands fascinated them. In fact, even the most disruptive students suddenly sat still and took notice, with the most unruly boy of the lot looking up at us and saying, “You mean I don’t have to be dumb?”

Indeed, the growth-mind-set message appeared to unleash students’ motivation. Although both groups had experienced a steep decline in their math grades during their first months of junior high, those receiving the growth-mind-set intervention showed a significant rebound. Their math grades improved. Those in the control group, despite their excellent study skills intervention, continued their decline.

What’s more, the teachers—who were unaware that the intervention workshops differed—singled out three times as many students in the growth-mindset intervention as showing marked changes in motivation. These students had a heightened desire to work hard and learn. One striking example was the boy who thought he was dumb. Before this experience, he had never put in any extra effort and often didn’t turn his homework in on time. As a result of the training, he worked for hours one evening to finish an assignment early so that his teacher could review it and give him a chance to revise it. He earned a *B+* on the assignment (he had been getting *Cs* and lower previously).

Other researchers have obtained similar findings with a growth-mind-set intervention. Working with junior high school students, Good, Aronson, and Inzlicht (2003) found an increase in math and English achievement test scores; working with college students, Aronson, Fried, and Good (2002) found an increase in students’ valuing of academics, their enjoyment of schoolwork, and their grade point averages.

To facilitate delivery of the growth-mind-set workshop to students, we developed an interactive computer-based version of the intervention called *Brainology*. Students work through six modules, learning about the brain, visiting virtual brain labs, doing virtual brain

experiments, seeing how the brain changes with learning, and learning how they can make their brains work better and grow smarter.

We tested our initial version in 20 New York City schools, with encouraging results. Almost all students (anonymously polled) reported changes in their study habits and motivation to learn resulting directly from their learning of the growth mind-set. One student noted that as a result of the animation she had seen about the brain, she could actually “picture the neurons growing bigger as they make more connections.” One student referred to the value of effort: “If you do not give up and you keep studying, you can find your way through.”

Adolescents often see school as a place where they perform for teachers who then judge them. The growth mind-set changes that perspective and makes school a place where students vigorously engage in learning for their own benefit.

Going Forward

Our research shows that educators cannot hand students confidence on a silver platter by praising their intelligence. Instead, we can help them gain the tools they need to maintain their confidence in learning by keeping them focused on the *process* of achievement.

Maybe we have produced a generation of students who are more dependent, fragile, and entitled than previous generations. If so, it's time for us to adopt a growth mind-set and learn from our mistakes. It's time to deliver interventions that will truly boost students' motivation, resilience, and learning.

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When Students Choose the Challenge

David Suarez

Through tiered instruction, students at different ends of the ability spectrum find success in math class.

I used to wonder why, despite my enthusiasm for teaching and my students' genuine interest in learning, I was missing the mark with so many middle school math students. However, after I put together Vygotsky's (1986) concept of the zone of proximal development with Mihaly Csikszentmihalyi's perspective on how to create joyful concentration or "flow" in learning, I understood my classroom dynamics better. According to Csikszentmihalyi (1990), enjoyment in learning "appears at the boundary between boredom and anxiety, when the challenges are just balanced with a person's capacity to act" (p. 52). Recognizing this truth, I couldn't ignore the obvious. My underperforming students were either bored or overwhelmed.

When I began teaching integrated algebra-geometry classes to 8th graders at Jakarta International School in Indonesia, I decided to structure my classroom so that students could choose their own zone of proximal development, the learning task that is just challenging enough to be motivating. Jakarta International School is a private, international K-12 institution with approximately 650 students in the middle grades (6-8). My students ranged from those who had been recommended for remedial math courses to those who had already learned much of the upcoming year's mathematics curriculum. The question of how to give

each student in this diverse group the opportunity to grow weighed on my mind.

As I struggled to select an appropriate common learning destination for a group in which the starting points were so different, I concluded that there was no single appropriate end goal. Instead, in 2005, a fellow teacher and I developed a tiered program of instruction that enables students to study the same content at different levels of challenge. We began implementing this system with 8th grade math students in the 2006–07 school year and are considering using a similar approach in 8th grade science.

Setting Up Tiered Instruction

We found that the most helpful approach to tiered assessments was to organize units of study into thematic units, with specific skill outcomes designated for each theme. For example, in a thematic unit on graphing, skill outcomes included converting between graphical, numerical, and symbolic representations of data and analyzing functions and patterns. Establishing these broad units enabled us to keep the number of traditional summative assessments to a manageable level by assessing at the end of each thematic unit rather than assessing each skill separately.

Our next step was to distinguish among foundational, intermediate, and advanced levels of understanding for each math skill. We designated each level of mastery by a color. Students choose their color level for each thematic unit and have the opportunity to vary their choices from unit to unit.

Green-level tasks meet the standard for proficiency for 8th grade mathematics at Jakarta International School. Blue-level tasks extend familiar skills into more complex work. To succeed at blue tasks, students must be able to recognize the subtleties that make a problem more complex and must be sharp in the required skills. Black-level challenges are the most complex and are appropriate for highly advanced and motivated students. They require the creative application and extension

of skills and sometimes require students to carry out unfamiliar tasks. Figure 1 presents examples of tasks at each level of challenge.

Figure 1. Sample Student Tasks at Different Challenge Levels

Lesson Topics	Green-level tasks (foundational)	Blue-level tasks (intermediate)	Black-level tasks (advanced)
Problem solving with linear equations	The difference in the ages of two people is 8 years. The older person is 3 times the age of the younger. How old is each?	The length of a rectangle is 3 less than half the width. If the perimeter is 18, find the length and width.	When asked for the time, a problem-posing professor said, "if from the present time, you subtract one-sixth of the time from now until noon tomorrow, you get exactly one-third of the time from noon until now." What time was it?
Understanding slope	Find the slope of the line passing through the following pair of points: $(-4, 6)$ and $(-3, 2)$.	Find a so that the line connecting the points $(-2, -3)$ and $(2, 5)$ is parallel to the line connecting the points $(6, a)$ and $(0, -4)$.	If $a > 1$, what must be true about b so that the line passing through the points (a, b) and $(1, -3)$ has a negative slope?

The Power of Student Choice

At the outset of my algebra-geometry course, I explained the different levels of tasks and assessments and asked each student to select the level of challenge most appropriate for his or her individual learning. I encouraged students to select the level of challenge that would help them maximize the speed and quality of their learning. Drawing on Jensen's (1998) work on how stress affects learning, I explained that choosing tasks that were too hard *or* too easy would lead to less than ideal stress levels: Tasks that were just challenging enough would make learning interesting but not overwhelming.

Consistent with Glasser's (1986) choice theory, empowering students to select their own level gives three major benefits:

- Students find choices motivating—often the key to achievement for middle schoolers.
- Students benefit from the opportunity to make decisions. Learning to reflect on personal learning and adjust tasks accordingly is a great skill for middle school students.
- Students can't conclude that a grouping decision made on their behalf is unfair or inappropriate.

My students consistently made appropriate choices and enthusiastically accepted this responsibility. One student, Ruth, wrote,

Being asked to choose from three different levels of difficulty has given me more choices and opportunities to challenge myself. . . . I feel that I have more "say" in the level of math I am learning.

How It Works in the Classroom

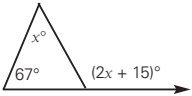
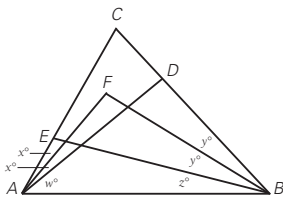
A typical day in my classroom begins with a brief period of whole-class instruction intended to illuminate the lesson's essential understandings. Students then select practice assignments at the level of challenge they desire. They work on these assignments for approximately 40 minutes in class and complete them at home. Students can choose a different level every day if they want, and their methods of operating vary. Some learners like to complete the same challenge level all the time, others switch often between levels.

In-class practice is essential because it gives students the opportunity to work with others who are interested in tackling similar challenges—and gives me an opportunity to help students. Most students enjoy working with others who are attempting similar problems. There's usually a buzz in the air as students seek out others, either as partners in problem solving or as helpers if a student is stuck. I seat students at

heterogeneously arranged tables but let them move around the room as needed during individual practice time.

Figure 2 shows three different levels of assignments that I provided my students after a lesson on triangle properties. This lesson was one of several in a thematic unit on angle relationships. At the unit's conclusion, students selected a summative assessment linked to angle relationships at a challenge level of their choice.

Figure 2. Tiered Work for a Lesson on Triangle Properties

Green-level task (foundational)	Blue-level task (intermediate)	Black-level task (advanced)
<p>Find the value of x</p>  <p>Source: Green-level task is from <i>Houghton Mifflin Unified Mathematics Book 1</i> by G. Rising, 1991, Atlanta: Houghton-Mifflin. Copyright 1991 by Houghton-Mifflin. Used with permission. Black-level task is from <i>Challenging Problems in Geometry</i>, by A. Posamentier and C. Salkind, 1988. New York: Dover. Copyright 1988 by Dover. Used with permission.</p>	<p>In $\triangle ABC$, the measure of $\angle A$ is three times that of $\angle C$, and the measure of $\angle B$ is twice the sum of the measures of $\angle A$ and $\angle C$. Find the measure of each angle.</p>	<p>In any $\triangle ABC$, E and D are interior points of \overline{AC} and \overline{BC}, respectively. \overline{AF} bisects $\angle CAD$, and \overline{BF} bisects $\angle CBE$. Prove $m\angle AEB + m\angle ADB = 2m\angle AFB$</p> 

I allow students to look at all of the assessments, compare them, and make their choice: They can even start one assessment, quit, and switch to a different level test if time allows. A student who does poorly on a higher-level assessment can go back and take the green-level assessment to demonstrate at least grade-level proficiency.

The Results

Higher Achievement . . .

Our teachers implementing tiered math instruction have been extremely pleased with the results so far. Students are performing at

higher levels of achievement, are more motivated, and are assuming more responsibility for their learning. What has surprised us is that, even though we have used the foundational level of performance in 8th grade mathematics as the “starting” green level, a level that no student is compelled to exceed, student performance across the grade level has *increased*.

Students at our school seem to strive for, and achieve, an *A-/B+* level of excellence no matter what assessment level they select. It follows, then, that if they are scoring at such a level on harder tests, their achievement has risen. By midway through the 2006–07 school year, teachers had asked 8th graders to make a total of 883 choices among levels of math assessments, and students most often chose harder-than-basic tests. Students selected green-level tests, which are similar to the whole-group assessments we used before introducing choice, only 33 percent of the time. They chose blue-level assessments (above the proficiency standard) 59 percent of the time, and black-level tests 8 percent of the time. Thus, students are now tackling greater challenges than in the past.

At the same time, test scores are holding steady compared with previous years, indicating that overall achievement has risen. In 2005–06, students in 8th grade algebra-geometry achieved an average score of 90 percent correct on the whole-group assessments they all took throughout the year (which were at the green level of difficulty). During the first year of tiered instruction, students in this class achieved average scores within a few points of 90 percent correct on the green-, blue-, and black-level assessments they took.

Before we launched tiered instruction, students at the beginning end of the readiness spectrum tended to bring a class’s average math test scores down. Now, instead of bringing average scores down on a whole-group assessment, students at the beginning end of the readiness spectrum score on green-level assessments at levels comparable to those of students taking the harder blue- and black-level tests. I

have been thrilled to see students at this “green level” improve their performance.

. . . And Eager Learners

Students consistently showed increased motivation once I gave them choices. If students believe themselves to be below average, they will generally perform below average on an assessment designed for the entire class. On the other hand, students who believe that assessments were designed with their readiness level in mind will expect themselves to be successful. Tiered learning fuels a positive self-fulfilling prophecy.

Positive Perspectives

Both students who have a history of stellar achievement in math class and students who start with more basic skills feel comfortable with the tiered system. Gabi, who tends to select green-level assignments, commented, “I like having choices because you can decide whether you are ready for a harder challenge or not.” Other students are enthusiastically tackling unprecedented levels of achievement. After taking a black-level assessment, Wa-Lee exclaimed, grinning, “That was hard!” When I asked Johannes how he was feeling about an upcoming black-level test, he replied, “Excited!”

At the conclusion of each unit, we ask students to reflect on how difficult or easy the work they picked was for them. Overwhelmingly, students reported feeling appropriately challenged. On 88 percent of the written reflections that 8th graders completed, students reported feeling appropriately pushed “toward the goal of maximizing their learning.” On only 7 percent of these reflections did students label the assessment that they had selected as “too simple” for them, and on only 6 percent did they label their choice “too challenging.”

Offering tiered choices allows students to modify future decisions if, in hindsight, they view an assessment they have selected as too simple or too challenging. With this arrangement, one student's growth and success in math need not come at the price of another's chance for the same. In fact, a very positive classroom culture has developed. Peer pressure now wields a positive influence as students take pride in confronting challenges and at times choosing a higher level.

My students learn a lot about themselves as they grapple with questions about what is best for them and move forward with new insights. Student responses to the prompt "How did you select your challenge level? Are you satisfied with your choice?" are revealing. Vishali noted,

[Blue-level work] is what I am comfortable with. I know I am capable of blue. I am satisfied with my choice because I learned and understood many new things. I know that if I had chosen black, then I would have been stuck in chaos.

Tanisha commented,

The three-choice color system helps improve learning because it gives you the feeling that no one is forcing you to do something that you might find too stressful. It also gives you a better idea of how to be independent and not have everything be decided for you.

Parents' reactions have also been very favorable. Parents of advanced students finally feel their children are being challenged in class, whereas the parent of a student at the other end of the readiness continuum remarked, "This is the first time my child feels successful in math." Another mother enthused,

This is making my daughter think about her learning and it gives her a chance to practice decision making. This is exactly what kids should be doing in middle school.

A Work in Progress

My colleagues and I recognize that our efforts are a work in progress. But our tiered approach to learning and assessment is positively affecting student achievement, and students and parents both prefer it to our previous curriculum. I do have a few words of caution, encouragement, and support for schools considering a similar effort.¹

First, the process of developing tiered assessments and differentiating instruction gets easier over time. If you are apprehensive, move ahead and don't paralyze yourself with worry. Second, keep your eyes open for challenging math problems. There is no shortage of foundational-level problems in traditional textbooks. We have, however, found that there is a short supply of high-level problem-solving tasks. Supplementary challenge handouts available in the teacher support materials accompanying textbooks are good places to start. I also keep my eyes open for challenging problems in mathematics books and Web sites.²

Finally, develop a grading system that is compatible with the differentiation practices you implement and be transparent about it with students and parents. We experimented during our first year of tiered instruction with weighting grades based on the level of challenge the student selected. This school year, however, the Jakarta International School is attempting "standards-based reporting." We report student performance against individual learning goals (rather than reporting one overall course grade) and report both the level of difficulty selected by the student for each learning goal (as a performance level) and the accuracy with which the student demonstrates mastery (as a letter grade). For example, a student might earn an *A*, *B*, or *C* on a task at any of the levels for any particular goal.

We continue to contemplate issues such as when and how much to guide students in their decision making, how to improve differentiation practices during instruction, and how to handle a situation in which the green level of challenge is beyond a student's readiness level. I'm excited at these opportunities for continued exploration into

tiered instruction and assessment. The journey so far has left me feeling closer than ever before to my goal of meeting students' needs as math learners.

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Endnotes

¹ For a more detailed explanation of how to implement a tiered instructional program in math, see Chapter 11 of *Making the Difference: Differentiation in International Schools* (Powell & Kusuma-Powell, 2007) or visit my blog at www.challengebychoice.wordpress.com/

² I have found the following resources helpful as sources of higher-level problems: *Challenging Problems in Algebra* and *Challenging Problems in Geometry*, (Posamentier & Salkind, 1988). *The MathCounts School Handbooks*, available at www.mathcounts.org. *Balanced Assessments in Mathematics*, available at <http://balancedassessment.concord.org>

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Paying for Performance: Giving Students Cash Incentives for Learning

Jennifer Henderson

Teachers and administrators are becoming more creative when developing student incentives for learning. What are the pros and cons of the programs in which students can earn cash or even MP3 players and prepaid cell phones in return for good grades and better scores on tests?

The Earning by Learning (EBL) program in Dallas, Tex., uses cash incentives to encourage children to read, paying participants for each book they read and report on. Since 1996, when the program began, 66,000 student participants have read a total of more than 650,000 books (an average of 10 books per student), according to EBL's Web site. EBL's founding director, Thelma Morris-Lindsey, believes that cash-based incentive programs are key to motivating students and helping them rediscover their passion for reading. "Most children come into schools wanting to read," Morris-Lindsey says. "They are natural scientists and ask thousands of questions. Somewhere along the line, we [the education system] dull that spark and enthusiasm for reading. Education, like all other formal systematic disciplines, must continue to create innovative solutions to address 21st century demands both nationally and abroad."

Morris-Lindsey is not alone in her belief that providing students with cash-based incentives will improve student learning and achievement. Similar incentive programs are popping up throughout the United

States. Although the programs may differ slightly in the type of rewards they offer and the grade levels and subjects they target, at the core of each is an incentive structure that awards students cash or, in some cases, items such as MP3 players and cell phones in return for good academic performance.

The Advanced Placement Incentive Program (APIP), first implemented in Dallas in 1996, can now be found in schools throughout Texas. Participating students are eligible to receive up to \$500 for each advanced placement (AP) exam score of 3 or above; teachers also earn cash bonuses based on student performance on the AP tests. The National Math and Science Initiative is replicating the APIP program throughout the country—for example, in Arkansas, Massachusetts, Virginia, and Washington.

The cash-based incentive programs receiving the most national attention are in New York City, Chicago, and Washington, D.C., and are being led and studied by Roland Fryer, a Harvard economist and the chief equality officer of New York City's Department of Education. According to the *Washington Post*, New York's program awards 4th–7th graders at select city schools up to \$10 for their achievement on each of 10 periodic tests. (New York City has also experimented with providing MP3 players and prepaid cell phones to students as incentives.) In Chicago, freshmen and sophomores at 20 high schools get \$50 for each *A* awarded in a five-week marking period, \$35 for a *B*, and \$20 for a *C*. In fall 2008, Chancellor Michelle Rhee of the Washington, D.C., school system implemented another program developed by Fryer, which gives 3,300 middle school students in the city the chance to earn up to \$100 every two weeks for good grades, behavior, and attendance.

Why Cash Incentives?

Proponents of cash-based incentives point out that these programs are currently being offered in lower-income schools where a number of

students have to hold jobs to help support themselves and their families. The 15-week Learn and Earn pilot program in Fulton County, Ga., last year paid middle and high school students \$8 an hour (up to \$32 a week) to attend after-school tutoring sessions. Programs such as this one are designed to help reimburse students for missing work due to academics. When surveyed for a 2008 poll conducted by The Principals' Partnership, a program created by the Union Pacific Foundation, some principals who support the concept saw giving monetary rewards as a means of allowing students to focus on their studies by compensating them for wages lost because of time devoted to school assignments.

In addition, proponents contend that lower-income students do not receive the same monetary incentives for academic performance that students from middle- or high-income families frequently receive, such as allowances, trips, or cars. Along the same lines, Richard Kahlenberg, a senior fellow at the Century Foundation, argues in a 2007 *Slate* article that the motivation to do better than just pass their classes is often seen more in economically advantaged students because they view "attendance at a four-year college as a real possibility." These students, he argues, "see evidence all around them of the importance of doing well academically." Kahlenberg cites the views of Albert Shanker, head of the American Federation of Teachers from 1964 until his death in 1997, who maintained that the incentive structure in American public education is biased in favor of upper-middle class and white students who strive to attend selective colleges. Shanker said that most of the students who either do not plan to go to college or plan to go to one that accepts virtually everyone have little or no motivation to perform well in school. Kahlenberg contends that cell phones and money "might seem like a poor substitute for that sort of motivation. But they're a whole lot better than almost entirely abstract notions of success." When contacted for this article, Kahlenberg said he still agrees with his 2007 position on the topic that cash-based incentive programs are at least worth a try.

What Opponents Say

Paying students for academic performance has also received strong criticism. Although more than half of 74 chief executive officers, chairpersons, and presidents surveyed by *USA Today* in September 2008 think paying for grades is a good idea, the 45 percent that were opposed were adamant in their opposition. The newspaper points out that the perspective of business leaders on this topic is important because funds from businesses will help support many of these pay-for-grades programs, such as the National Math and Science Initiative, funded by the foundations of Exxon Mobil, Bill and Melinda Gates, and Michael Dell.

Some opponents of the initiatives are also worried that rewards will change student behavior only on a short-term basis. “I see no benefits to cash incentives for performance,” says Julia Steiny, the Sunday education columnist for the *Providence Journal* and a former member of the Providence school board. Steiny says her main concern is that once the incentive goes away, the behavior will as well. In her *Providence Journal* column, she wrote, “Americans have grown so test-score obsessed that schools and districts will do anything, even bribe, to get a short-term bump in the almighty scores.”

In the poll conducted by The Principals’ Partnership, more than 82 percent of the 438 principals who responded opposed the idea of paying students for grades. Most felt that students should be naturally motivated to succeed in school and that a monetary reward would not help students develop the necessary motivation for success in higher education or the workplace. Many respondents also felt that individual families—not schools—should be the ones who decide whether or not to pay students for good grades.

What Research Says

Research on the effect of cash-based incentives on student performance is currently as mixed as individual opinions on the topic. C. Kirabo Jackson, a Cornell University economist, found that students participating in the APIP program in Texas earned higher ACT and SAT scores and were more likely to enroll in college. The research, which appeared in the fall issue of *Education Next*, also found that the APIP program appears to have the biggest impact on African American and Hispanic students. “These outcomes are likely the result of stronger encouragement from teachers and guidance counselors to enroll in AP courses, better information provided to students, and changes in teacher and peer norms,” Jackson explained in a press release issued by *Education Next*.

Other research results are more ambiguous. Results from an experiment in Coshocton, Ohio, to pay elementary students for scoring higher on state exams show that 3rd–6th graders improved their math scores, but the incentives had no effect on reading scores and only a minimal effect on science and social studies scores. And a preliminary study of a New York City program that offers students at 31 high schools cash for scoring well on AP exams found that, although the number who passed declined slightly, the number of test takers rose, which can be viewed as a positive result.

Overall, the jury is still out on whether or not cash-based incentives benefit students; much more research is needed. But proponents are encouraged by preliminary results and are moving forward. In the *New York Times*, Fryer echoed EBL’s Morris-Lindsey’s sentiments: “I’m not saying this is going to fix everything, but I am saying it’s worth trying. What we need to try to do is start that spark.”

Resources

For more information about cash incentives for students, try these resources:

- Earning by Learning of Dallas program: www.eblofdallas.org.
- The 2008 Principals' Partnership Poll: www.principalspartnership.com.
- Jones, D. 2008. CEOs split on paying for good grades. www.usatoday.com/money/companies/management/2008-09-10-pay-for-grades_N.htm.

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Inspiring Students to Strive for Excellence

Merrill Harmin with Melanie Toth

How can we inspire students to attack schoolwork with more of their best motivations, that is, with more of their natural motivations to live with full dignity, steady energy, intelligent self-management, feelings of community, and open awareness? In one way or another, that is the question addressed throughout this book,¹ of course. Most of the chapters focus on a particular teaching task—from planning lessons to managing misbehavior—and suggest strategies for handling the task in ways that elicit such healthy motives. This chapter contains strategies that focus more directly on improving students' motivations. Our field tests suggest that the first four strategies deserve most teachers' first attention.

Strategy 25-1: High Expectations

Purpose: To take advantage of the power of expectations.

Description: Maintaining an expectation that students will do the best they can, even when there is no evidence they will do so.

As a teacher, we never want to give up on any students. When, for example, we plan a lesson, we are wise to fully expect that all students will get involved actively and responsibly. When some do not, we do well to assume they had good reason not to and, in the next lesson, they will become actively engaged. That is, we should never assume that any student lacks a willingness to be fully engaged. If we were to expect students not to become engaged unless, say, we gave them

rewards and punishments, grades and tests, reminders and scoldings, they would likely oblige us. Expectations have power. We tend to get what we expect to get (Marzano, 2003).

It is valuable, then, to continually expect all students to be active learners. The message of this strategy is then simple: Find a way to hold that expectation. It is, we believe, one of our most influential, far-reaching strategies. If necessary, put a note on your desk or otherwise create a reminder that will help you keep that expectation alive.

If you're doubtful, remind yourself that your students probably tackle their hobbies with high spirit. Perhaps check it out. Ask them about their nonschool activities, their games, teams, social activities, the activities they really care about. The New or Goods strategy (Strategy 9-4 in *Inspiring Active Learning*) serves this purpose well. As students talk about the activities they enjoy, observe their spirit. Use that as a reminder that the capacity for active engagement exists in these young people. Is it not possible that we can bring that live energy into the classroom?

We suspect that few students want to be poor readers, clumsy calculators, ignorant of what goes on in the world. It is unlikely that they see any advantage in being unskilled and ignorant. Said another way, students' natural motives support active learning. If, then, we design Action Flow Lessons (Strategy 3-1) that keep students naturally, comfortably engaged, would it not be reasonable to expect that they will, in fact, do the best they can with those lessons?

This is not to say that it's not sometimes challenging to keep expectations high. Here is one teacher's observation:

I had become disillusioned and frankly had low expectations for my students. I also had a lot of reason not to expect much. After all, none of the faculty was able to get much from them. At first I tried to imagine that my students would get actively involved in lessons, but it never lasted long and I had trouble believing it. Then my support buddy and I agreed to ask each other at lunch each day how we were doing at expecting active

engagement, and that helped. In fact, we are now convinced that students do work harder when we expect them to. Yet, to be honest, we still need to remind each other at lunch. It's really hard, at least for us two, to hold high expectations in this depressed school.

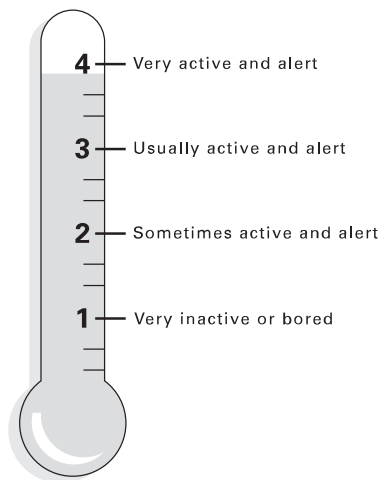
It certainly can be hard. But it also can be easy! Try expecting it to be easy and see what happens. And consider getting a support buddy as this teacher did. Progress is almost always smoother when we proceed with a friend.

Strategy 25-2: Active Learning Thermometer

Purpose: To monitor active involvement and remind students of its importance.

Description: Regularly asking students to rate the level of their involvement in class work.

Can we expect equally high test scores from all students? That is unrealistic and ultimately discouraging, for there is no way all students will achieve equally high test scores. But we can expect all to do their personal best. And we can heighten that expectation by using the Active Learning Thermometer shown here.



To introduce this strategy, we might tell students that we expect them all to stay fully involved in their work and to do the very best they can. “Because you all have different interests and backgrounds,” we might say, “I do not expect all of you to accomplish an equal amount. But you can all be equal in working as hard as you can.” Pointing to the Active Learning Thermometer, we might then explain the various numbers on the scale:

Sometimes you might be very alert and actively involved in a lesson, doing the very best you can. You are then high up on this thermometer, up here, at 4.

Believe it or not, sometimes students are not at all active. Maybe they are feeling a little sick, or tired, or distracted, or upset. At such times they would be down here, at 1.

And sometimes students are in between. We might say they are *usually* alert and active, up about here, at 3. Or they might be *sometimes* active and alert, down about here, at 2.

After this explanation, we might ask students to think about how actively involved they were earlier in the day, when the class was involved in a particular activity. Then, demonstrating each movement, we might tell the students:

When I say “Go,” leave both hands where they are if you would rate yourself 1. Put a hand on your chest like this if you would rate yourself 2. Put a hand on your neck like this if you would rate yourself 3. Put a hand on your head like this if you would rate yourself 4. Go!

When we see that everyone understands the procedure, we might tell students that we will repeat the activity from time to time to see how well everyone is doing at keeping actively engaged, and that our goal is to help all of them get to the top of the thermometer and stay there. “Your job will be to let me know what I can do to help you get up

there. If we keep active involvement high, we can be sure that you will be taking as much learning as possible from this class.”

After students are accustomed to the procedure, we need only point to the Active Learning Thermometer and direct students to use the hand movements to indicate how actively involved they were. Alternatively, we might ask students to write a number on a card or piece of scrap paper and hand it in. Either way, we’ll be able to make a quick assessment of active learning. If we use the strategy regularly, we can chart progress, though doing so is not necessary. Used regularly, the hand-movement procedure itself is valuable. It reminds both us and our students that high, productive engagement is a prime goal. It’s an easy way to keep alive the active learning goal.

If we do record scores, note that it’s advisable to have several sample runs, so that students become accustomed to the procedure and settle in on some personal definition for each level on the “thermometer.” We can then proceed in several ways:

- Have each student rate his or her level of engagement every day, recording the number on a slip that is then put in an envelope. Sort the slips and make a chart to show progress over time. Aim to gradually eliminate 1s and 2s and increase 3s and 4s.
- Do the above procedure on three consecutive days only once each month. Average the three daily scores to get one monthly score. Then chart the scores for September, October, and so on through the year, aiming, as before, to show progress toward eliminating 1s and 2s and increasing 3s and 4s.
- To simplify scoring, consider collapsing ratings 1 and 2 and chart them as “low involvement,” and collapse ratings 3 and 4 and chart them as “high involvement.” The aim then is to eliminate all low involvement.
- Consider having a responsible parent, other staff member, or even a student do the assessments. However, for consistency,

if you want to track scores, use the same person and procedure each time.

Strategy 25-3: Clarifying Excellence Discussion

Purpose: To help students appreciate the value of striving for excellence.

Description: Discussing what defines excellent work and encouraging students to strive for it.

Some students assume excellence is a high test score and each person must produce such a score or, unhappily, be a less than excellent person. However, what is excellent for one person may not be excellent for another. The best all students can do is strive toward excellence while taking care to avoid getting down on themselves when they have not yet reached it. It's when students get down on themselves and give up even trying that their motivation collapses and problems intensify. If there is one outcome we do not want, it is discouraged students. What is the best way to approach this issue? Teachers report that Truth Signs and Cushioning Questions (Strategies 4-1 and 4-2) are especially valuable. An open discussion of the issue can also be valuable. We can ask questions like these:

- *What are the advantages of striving for excellent results?* In the discussion we can acknowledge that it is usually more fun, of course, to play to win.
- *How are we to react when we have not yet produced excellent results?* The truth is that anything less than full self-acceptance makes further progress harder. It often makes it harder to get a good night's sleep, too.
- *How should we view people who do not care about reaching for excellence in some areas of their lives?* Discussing this question often leads to an understanding that minimum performance standards are necessary in some areas (such as

driving a car, working in an office or factory, swimming in deep water), even when excellence is not required. The discussion also may lead students to see the unreasonableness of expecting a person to be excellent in all areas.

- *How do you know when you can be satisfied with your current work?* Here we might aim to help students appreciate the advantage of not relying entirely on others' assessments and to consider how they personally would judge their efforts: Did they do the best they could do at the time?

We might also consider continuing the discussion by

- Sharing with students our own positive and negative experiences in attempting to produce excellent results.
- Asking students to interview other adults using some of the same questions.
- Asking students to evaluate, then dramatize or illustrate, the strive-and-accept motto: "Strive to do your best. Accept whatever results."

Strategy 25-4: Best-Work Lesson

Purpose: To clarify what it means to do one's best work.

Description: Asking students to review samples of their best work to clarify what is "best work" for them and then encouraging them to aim for that target in all future work.

Teachers often announce standards, but students do not always commit to them. One strategy to improve commitment to high standards is to help students develop their own definition of such standards. Here is a possible lesson sequence:

1. Ask students to identify samples of what they consider their "best" work. This may include work done at school or

home, for themselves or others, including hobbies and jobs or chores around the house.

2. Ask students to list qualities that contributed to making the samples their “best” work, such as neatness, originality, effort.
3. Create a chart with a master list of the qualities students identify.
4. Conduct a discussion around questions like “Which qualities were mentioned most often?” “Do you think some of these qualities are more important than others?” “What qualities would you like to be represented in *your* future best work?”
5. Finally, ask students to make a personal list of qualities that would indicate to them that they did the best work they could do.

The next time we give an assignment, then, we can tell students to aim to have their completed work reflect their personal list of “best” qualities. (A somewhat open-ended and long-term assignment usually works best for this.) After this assignment is completed, student pairs might share work, noting for each other which “best” qualities they clearly see and perhaps which ones are lacking. Students might even give themselves a private “grade” for effort on the assignment and keep a record of such grades over time. Some teachers have used such private-effort grades to support notes to parents saying, for example, “Juan is more often doing the very best he can lately. I am proud of him.”

Strategy 25-5: Inspiring Statements

Purpose: To inspire students to strive for excellence.

Description: Cheering students on to do their very best.

As all coaches know, the right comment at the right time can inspire people to reach down deep and exceed all expectations. If you are unpracticed in cheering students on, know that effective comments

are rooted in genuine, respectful care. They say, in effect, “I’m with you.” “I want this for you.” “Working together, we can do the job.” They do not say, “Do this for me.” “I’m insisting on it.” “It is required.” They pull, rather than push. Consider the distinction:

Pushing: I want you all to master this material. It is extremely important. I will have no student of mine leaving here without knowing this backward and forward.

Pulling: You will really need this material. I’m committed to doing whatever I can to make sure you master it. Are you willing to work with me and go for it? It will be a challenge—let’s do it!

It is often the care of one person for another that ignites an inner power that leads to inspired results. Words without genuine care are largely ineffective. And if the care is mutual, if the students, in fact, also care for the teacher, the inspiration flows along a highly charged path. It can be the path of inspired service, even love. We can then in full honesty communicate the message: “We are in this together, but I can’t do the learning for you. You must do it. By now you know how much I care for you. I want to be proud for you, not for me. Show the world you can do it. Go to it!” The words, of course, are not the main thing. It’s the intention behind the words that counts.

We once heard about an elementary school principal in Illinois, Frank Beczkala, who wanted to inspire students to do more reading. “If every student reads more,” he announced, “I, who am deathly afraid of high places, will stand on the roof of this building and read aloud a story to those assembled below.” The students met their challenge. And so did he.

Strategy 25-6: Going for the Gold

Purpose: To inspire students to strive for excellence.

Description: Challenging students to handle everyday tasks at a high level of excellence.

Consider asking students to do a simple task without trying very hard, say, drawing 3 circles or writing the first 10 letters of the alphabet. Then tell them to repeat the task, this time doing their best. This means, you might explain,

- *Striving:* Doing the very best you can, not doing just an ordinary job. Reaching far beyond the level of work you might do without this special challenge. Perhaps reaching for a level of excellence you never attained before. In essence, going for the gold.
- *Risking:* Trying new behaviors. Not staying with what you know you can readily handle. Perhaps reaching out for unfamiliar skills, speed, accuracy. Stretching yourself.
- *Persisting:* Not giving up. Sticking to it. Overcoming any urge to handle the task at a level below your very, very best. Absolutely refusing to accept less from yourself.

You might conclude by discussing which experience felt more satisfying and which produced better results. Some follow-up questions:

- How did you do? What was hard? What was fun? Did anything surprise you?
- Why do you think it's important to accept yourself if, this time, you didn't do your very best? What might happen if you didn't accept yourself in this situation?
- What if someone's best is not as good as another person's best?
- What would you say about this quote: "It's not whether you win or lose. It's how you play the game."
- How many of you would sometimes like to challenge yourself to go for the gold? When might you do that?

- How can we celebrate our efforts? What would encourage us again to go for the gold? Why would we want to do that?

Evidence suggests that such lessons increase student achievement more than do lessons on ways to improve comprehension or manage study time (Craske, 1985; Van Overwalle & De Metsenaere, 1990; Wilson & Linville, 1982).

As teachers, we give students many tasks: academic tasks, such as completing a project or a homework assignment; and administrative tasks, like cleaning up after art or running errands. We would want students to know that striving for excellence is a choice always available when handling any of these tasks.

Strategy 25-7: E-for-Effort Certificates

Purpose: To reinforce the value of doing one's very best.

Description: Regularly acknowledging student effort and occasionally offering certificates to formalize such acknowledgment.

Students are often inspired when they know teachers appreciate a big effort. Offering E-for-Effort Certificates occasionally is one way to keep communicating such appreciation. Such certificates are especially valuable as a follow-up to the preceding strategy, *Going for the Gold*. Consider the following excerpt from Marzano, Pickering, and Pollock (2001):

Ian MacIntosh was a new student at Prairie Elementary School. It did not take him long to discover that even though the teachers and students seemed nice enough, the school was considered to be what they called a "low-performing school." They had low scores on the state tests, and everyone knew it because the results were published in the local newspaper. The test was given soon after Ian arrived and, like other students, he just wanted to get through it.

The next year, the school got a new principal, Ms. Heichman. Things began to change. Ian's teachers started telling stories of famous people who achieved their goals because they believed that if they tried hard enough, they could do anything. Even students were asked to give examples, and Ian told the story of his grandfather's belief that he could make his farm successful. Ian's teachers started giving students "E for Effort" certificates. Ian earned two in one week. It made him feel more confident and made him want to do better. His classmates all seemed a bit more confident, too, especially when the whole class received the principal's "E for Effort" award because the class beat their own previous class average on math quizzes, twice in one month. He was proud when the banner went up over the door—and he enjoyed the ice cream the room mothers had promised them if they hit their goal.

The best news came when the state test scores returned. The school was in the headlines as the school that had improved the most. Ian knew he and his schoolmates still had a long way to go, but he believed they could do it. (p. 49)

In addition to giving E-for-Effort Certificates, we can also consider these actions:

- Remind students often that they will learn much more when they try much harder. Other strategies in this chapter can provide such reminders.
- Include grades for effort on report cards, and emphasize their importance, as suggested by Strategy 32-2, Dual Grades.
- Make calls or send notes to parents of students who markedly increase their effort, as suggested by Positive Parent Schedule and Surprise Personal Notes (Strategies 27-9 and 32-4).

Strategy 25-8: Personal Model

Purpose: To communicate high expectations through teacher modeling.

Description: Exemplifying a person who works with high DESCAs—dignity, energy, self-management, community, and awareness.

Historian and author Will Durant reminds us that “we teach more by what we are than by what we teach.” What we are speaks loudly—perhaps more loudly than anything we can say. It is best, then, to practice what we preach. If we want to see our students working with high DESCAs—dignity, energy, self-management, community, and awareness—we would do well to strive to do the same. More specifically, we should strive to act

- With dignity, ready to assert our own needs.
- With energy, not drained by too many commitments.
- With self-management, not afraid to take initiative.
- With a sense of community, not trying to go it alone.
- With awareness, alert to the needs of our students and ourselves.

When we shine our own light, we are more likely to see our students shining theirs.

▲ TEACHER COMMENT

During my first year of teaching I lost my voice. I trudged into school one day and informed the students that I was unable to speak above a whisper. It was a particularly large and active class, and I expected it to be a difficult day. Instead, responding to my whispering, most of the students began whispering themselves. To my surprise, by lunchtime my classroom was more quiet and peaceful than it had ever been. That was the first time I realized how much influence my own behavior had over theirs.

—Alicia Lopez, 8th Grade Social Studies Teacher

Strategy 25-9: Inspiring Stories

Purpose: To strengthen student idealism and encourage students to act on their ideals.

Description: Calling attention to people with inspiring life stories.

Many teachers report it worthwhile to call attention to people who exemplify high levels of idealism or who successfully overcame serious obstacles, such as Helen Keller, Jackie Robinson, Nelson Mandela, and Thomas Edison. We might ask students to reflect on the stories of such people, to write about or illustrate their lives, or to role-play how they themselves might handle similar situations. For one rich source of inspiring stories, see the *Chicken Soup* series by Jack Canfield and Mark Victor Hansen. We might also take time to share inspiring stories from our own life and encourage students to do the same. And we might create an area for posting inspiring stories, quotes, pictures, or anything else that we or our students find inspiring. Inspired students, after all, are most likely to produce inspired schoolwork and to grow up to become positive, inspired citizens.

Strategy 25-10: DESCА Challenges

Purpose: To advance students' capacity to do excellent schoolwork.

Description: Challenging students to stretch their ability to live and work with dignity, energy, self-management, community, and awareness (DESCA).

Teachers can empower students profoundly by occasionally offering nondemanding but stimulating challenges aligned with the five themes of DESCА. Some examples for each quality follow.

Challenges to increase dignity:

- Stand tall.
- Move ahead with confidence.
- When someone is being teased, step up and defend the person.

- Walk away when people are gossiping.
- Even if it feels risky, call up your courage and do what you think is best.
- Speak up for yourself.
- Respect your own ways, your own time clock.
- Show your willpower.
- Look people in the eye.
- Refuse to be put down.
- Show you can take it.
- Say it as if you mean it.
- Show your inner strength.
- Stand up for what you believe in.
- Sit tall in your chair.
- Reach deep inside for your courage.
- Act with authority.

Challenges to increase energy:

- When you are ready to give up, take one more step.
- Stick to it.
- Use all your brain power.
- Go for it—put your all into it.
- Walk briskly.
- Take initiative.
- Use your whole self.
- Practice stepping with a joyful aliveness.
- Speak with full energy.
- Make your eyes bright.
- Relax now to be strong later.
- Get yourself ready.
- Make sure you get enough exercise.
- Move right along.
- Reach down for more ability to persist.
- Make sure you get plenty of sleep.

Challenges to increase self-management:

- Control your impulses.
- Take care of unfinished tasks.
- Think things through for yourself.
- Go past the first idea.
- Ask for help when you need it.
- Look ahead and plan.
- Trust that you will know what to do.
- Proceed by your own time clock.
- Notice when something needs to be done.
- When feeling stuck in inactivity, get up and do something.
- Tell yourself you do not have to be negative.
- When you are angry, slowly count to 10.
- Practice starting immediately.
- Practice stopping immediately.
- Manage your own time.
- Take control of your behavior.
- Organize your papers.

Challenges to increase community:

- Respect the differences in others.
- Practice going out of your way for others.
- Be all for one, one for all in this class.
- Listen to others.
- Help clean up.
- Do more than your share.
- Accept compliments.
- Care for those who need it.
- Cheer people on.
- Show your appreciation.
- Reach out to newcomers.
- Be honest.
- Accept all people for who they are.

- Tell people when you do not understand.
- Stand up for our group.
- Look for the good in everyone.
- Let us know when we make mistakes.
- Do something good for the community.
- Do something extra at home.
- Ask family members how you can help them.
- Pick up trash when you see it.
- Connect to someone new.

Challenges to increase awareness:

- Keep alert.
- Read with an open mind.
- Call up your intelligence.
- When your attention drifts, bring it back, stay awake.
- Enjoy hearing, seeing, feeling, smelling, tasting.
- Practice ignoring distractions.
- Recall past ideas.
- Notice when someone needs help.
- Notice nonverbal messages.
- Focus your attention.
- Look closely at details.
- Look below the surface.
- Wonder “what else?”
- Open yourself up to big ideas.
- Keep a log of your thoughts, dreams, feelings.
- Notice what is being left undone.
- Notice what is going on.
- Keep alert to the state of your body.
- Pay attention to colors and sounds.
- When you are going too fast, back off.
- Notice your feelings. Where do feelings show up in your body?

- End each day by asking what you liked and what you might do differently next time.

Strategy 25-11: DESCA Proclamation

Purpose: To create a classroom climate that empowers student growth.

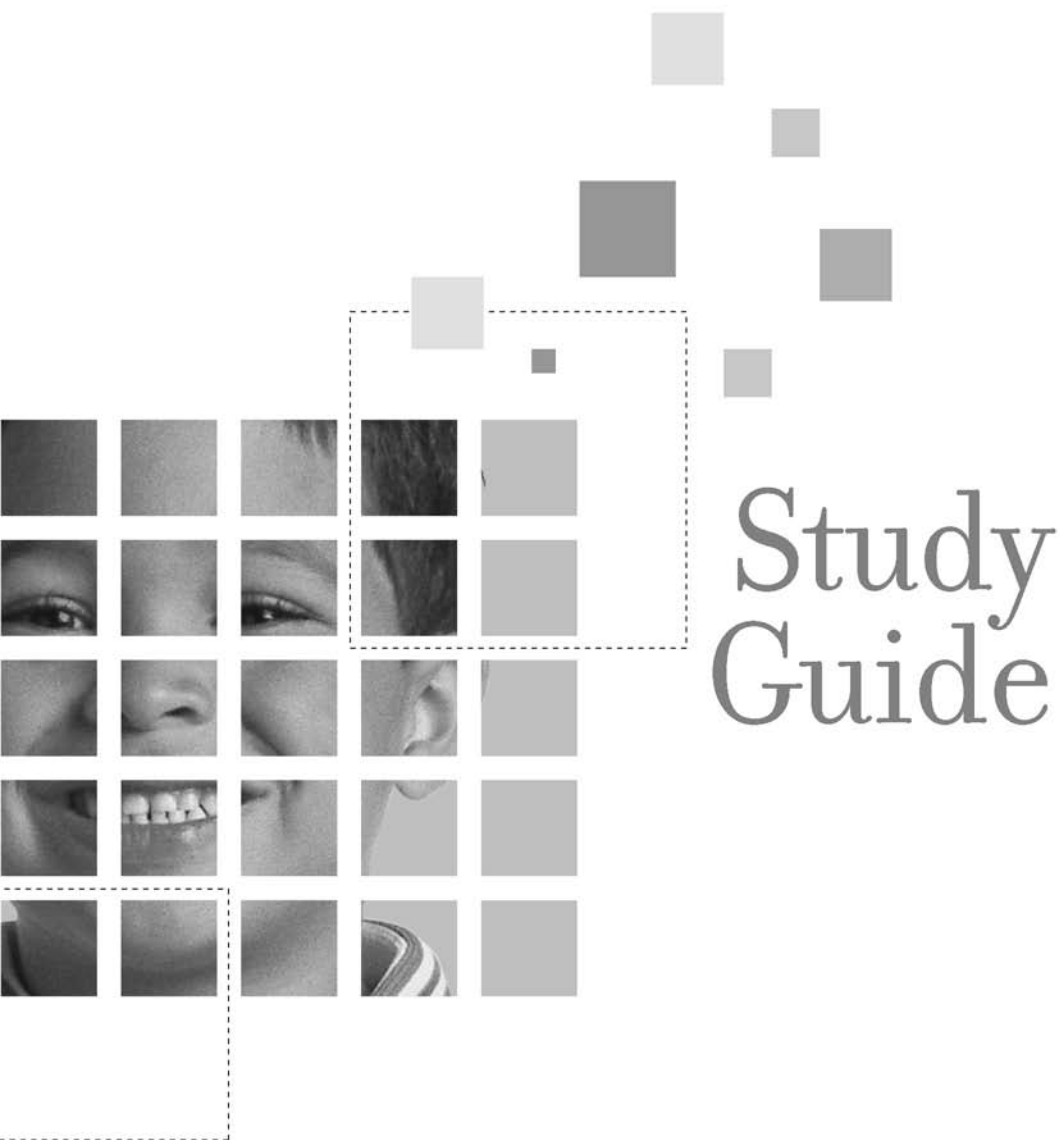
Description: Proclaiming “This is a high DESCA classroom” to assert an intention that we and our students are expected to highly value the use of dignity, energy, self-management, community, and awareness.

Announce to the class, “This is a high DESCA classroom,” and explain how, as humans, everyone is naturally motivated to live and work with dignity, energy, self-management, community, and awareness—what we call DESCA—and that you want students to learn to live and work that way in your classroom. Some teachers post a sign with this proclamation. Some also have students do a choral reading of the DESCA Proclamation from time to time, typically before a test or other activity in which students might stretch those DESCA abilities.

Endnote

¹ Mentions of “this book” and the chapters and strategies in it refer to the original publication, *Inspiring Active Learning*.

² Originally published in Harmin, M., & Toth, M. (2006). *Inspiring active learning: A complete handbook for today's teachers* (expanded 2nd ed., pp. 318–331). Alexandria, VA: ASCD. Reprinted with permission.



Challenging the Whole Child

Study Guide for Challenging the Whole Child

Naomi Thiers and Teresa Preston

Part 1. Challenging Every Student

Excellence for All, *Educational Leadership*, October 2008

Learning From World-Class Schools, *Educational Leadership*, October 2008

Creating Excellent and Equitable Schools, *Educational Leadership*, May 2008

Why We Run Our School Like a Gifted Program, *Educational Leadership*, October 2008

What Is Excellence?

Before we can pursue excellence, we need to agree on what excellence looks like. Several *EL* authors have offered ideas on what constitutes excellence—and how some schools fall short.

- In his article “Excellence for All,” Robert J. Sternberg describes four models of excellence that appear in schools today. Some schools focus on getting their low-performing students to meet minimum competency standards. Some focus on their high achievers. Others define excellence as intellectual conformity, and still others look to average test scores for their definition of excellence. How does each model fall short? What can your school do to avoid falling into one of these traps?

- Sternberg challenges schools to help students grow in both the traditional three *Rs* (reading, writing, and 'rithmetic) and what he calls the “other three *Rs*”: reasoning, resilience, and responsibility. Tony Wagner in “Rigor Redefined” lists seven survival skills that students need to succeed in the future. These include critical thinking, collaboration, adaptability, initiative, communication skills, ability to access information, and imagination. What skills do you think an excellent education provides for students? How are you helping students build these skills?

Designing for Challenge

To make school an arena of challenge for every child, schools must at times demand excellent effort even from students who start out far behind and show little initiative in asking for support, as was true of “Eduardo,” (profiled in “Creating Excellent and Equitable Schools” by Linda Darling-Hammond and Diane Friedlaender). Eduardo’s teacher warned administrators at New Tech High that he would be unlikely to reach out for help, so teachers initiated supportive relationships with him and made sure he understood that they were behind him *and* they expected him to perform to high standards. This article explores how five innovative schools serving low-income students of color—like New Tech High—create conditions that meld such supportive relationships with nonnegotiable expectations for high achievement.

- Consider the features of school design that the authors found were characteristic of these schools—personalization, a low teacher-to-student ratio, and rigorous and relevant instruction. Does your school incorporate these elements? How might you make changes in your school’s design to bring in some of these features?

- **For high school educators:** What changes could you realistically make to forge an environment in which each student is connected to an adult advisor for all four years or in which teachers and students forge family-like relationships? To make sure each new student gets a message of unrelenting support within their first few weeks?

Part 2. Offering a Rigorous Curriculum

The Thought-Filled Curriculum, *Educational Leadership*, February 2008

How Mathematics Counts, *Educational Leadership*, November 2007

Why Aren't More Minorities Taking Advanced Math? *Educational Leadership*, November 2007

What's Been Lost in the Bubbles, *Educational Leadership*, October 2008

How to Spur Deeper Thinking

Look over the teacher comments about the evidence they see of students' shallow, unskilled thinking that begin Art Costa's article "The Thought-Filled Curriculum." Discuss as a group: Do these comments reflect what you see among students? Which nugget of frustration most mirrors an area in which *you* see student thinking needing improvement?

As one of five strategies for shaping curriculum that spurs better thinking, Costa recommends guiding students to gather substantial information and research concepts about a question worthy of debate (such as what to do about overpopulation) and then to draw on that research to discuss the question in depth as a group:

One way to enhance [skillful] thinking is to get students intrigued by relevant, generative, conceptual knowledge. Cognition and content are inseparable. One cannot think about "nothing"....Further, the deeper knowledge a learner has, the more analytical, experimental, and creative are that learner's thought processes.

Do you agree that “cognition and content are inseparable”? Is it essential that students have a wealth of knowledge about a subject or a policy question before they can think about it in any depth? Or should we challenge students to generate their own perspectives and brainstorm ideas even in territory where they aren’t experts?

Teaching Challenging Classes

For a better understanding of fractions, maintains Lynn Arthur Steen (“How Mathematics Counts”), students learn best when teachers combine reasoning *with* numbers and real-world reasoning *about* numbers. Educators must fix in students’ minds the real-world implications of fractions as they represent the strength of some human construct—such as popular opinion on a topic or the amount of time people spend in particular activities. Steen believes connections between math and life should be made in all disciplines, not just math class.

- Whatever discipline or grade you teach, challenge yourself to present to students one or two real-life scenarios related to your discipline that require an understanding of fractions or proportions. Include a visual element (such as a bar graph) or a hands-on component (such as having young students make a check mark next to the name of each student in his or her grade who is on a sports team). Discuss with students how understanding and manipulating fractions relates to this real-life situation.

Part 3. Developing Student Thinking

Disciplining the Mind, *Educational Leadership*, February 2008

Linking to Prior Learning, *Educational Leadership*, April 2009

Stepping Beyond Wikipedia, *Educational Leadership*, March 2009

The Importance of Deep Reading, *Educational Leadership*, March 2009

Thinking is Literacy, Literacy Thinking, *Educational Leadership*, February 2008

Little Philosophers, *Educational Leadership*, October 2008

Thinking Like a Professional

Howard Gardner and Veronica Boix Mansilla (“Disciplining the Mind”) assert that, in an age of ever-changing information, teaching students to memorize facts does them a disservice. Instead, we should instill disciplinary thinking, “the disposition to interpret the world in the distinctive ways that characterize the thinking of experienced disciplinarians.” Teaching students to think the way scientists or historians think gives students a framework for interpreting the constant flow of new information.

- Reflect on how you presented information in a recent lesson or unit. Did you provide students any guidance on how people working within this content area tend to approach and work with such information—such as how to prioritize which information is most important? How might you do so in a future lesson?

Thinking from a Language Learner’s Perspective

Regardless of the instructional arrangement in their schools, teachers can tap students’ prior learning in their native tongues as a resource, argues Yu Ren Dong (“Linking to Prior Learning”). Try the assignment Dong gives preservice teachers, and report back to the group:

- Examine materials used in your classes—such as textbooks or worksheets—and strive to perceive them through the eyes of a non-English-speaker. What vocabulary or features might present obstacles? What words or cultural concepts common in an ELL’s home culture, particularly cognates, might give

that learner an entrée to understanding these materials (such as the fact that *algebra* is an Arabic word)?

- If a subgroup of your class speaks the same second language, ask a bilingual student—or parent—to translate key vocabulary for a science, art, or other content area unit into that language. Inject this vocabulary into your oral introduction to the unit, calling on ELLs to correct your pronunciation. Did you notice ELLs more engaged in this home-language-peppered lesson? Did you realize how much they already knew?

Doing Research Right

“Stepping Beyond Wikipedia” by William Badke explores how students use online resources to do research.

- How has the easy availability of online information changed how your students do research? For example, do you see more plagiarism today than in the past? Do you find that students are able to access more useful information? Or are they just finding more information, instead of better information?
- What is your attitude toward Wikipedia? Do you allow students to cite it in their research? What guidance should teachers offer to ensure that students are getting accurate information from Wikipedia and other sites?

Part 4. Meeting 21st Century Challenges

Orchestrating the Media Collage, *Educational Leadership*, March 2009

The Window Into Green, *Educational Leadership*, May 2009

Becoming Citizens of the World, *Educational Leadership*, April 2007

Stirring Up Justice, *Educational Leadership*, May 2009

Creating Our Global Citizens

In “Becoming Citizens of the World,” Vivien Stewart tells how to better educate our students about other countries. She says,

Teaching students about the world is not a subject in itself, separate from other content areas, but should be an integral part of all subjects taught. We need to...inspire students to explore beyond their national borders.

- Gather a group of willing teachers and administrators in your school to brainstorm ways you could bring an international connection—including collaboration with students from other countries—into a class or school project you have planned this semester. Consider the possibilities that Stewart mentions—volunteering with an internationally-focused group, creating exchanges or projects with international students online, reconnecting your students to their heritage languages, and other ideas appropriate to your school context.

Getting Stirred Up

In “Stirring Up Justice,” Laurel Schmidt asks, “Are there some behaviors or conditions that we simply must address, no matter how difficult or unpopular our work will be?”

- What behaviors or conditions do you believe schools have a responsibility to address? How should schools address these issues, and how should they react to any controversy that might develop?
- Schmidt notes that “kids rarely accept injustice as the status quo.” What issues have you seen students get fired up about? How did you respond and why?
- Reflect on your own experiences with social justice by following Schmidt’s suggestion and writing your own social justice

autobiography. If possible, focus on a problem that you've encountered as an educator. Consider how you might build on that experience.

Part 5. Using Assessment to Spur Achievement

Assessing What Matters, *Educational Leadership*, December 2007/January 2008

The Best Value in Formative Assessment, *Educational Leadership*, December 2007/January 2008

Data in the Driver's Seat, *Educational Leadership*, December 2007/January 2008

Formative Assessment That Empowers, *Educational Leadership*, November 2008

What's Really Important?

In "Assessing What Matters," Robert J. Sternberg asserts that assessments should go beyond academics to assess wisdom and creativity.

- Sternberg says that we should assess students in "what it takes to be 'expert' citizens." What do you believe constitutes an "expert" citizen? How can teachers help students build the necessary skills for life?
- Do you currently assess wisdom and creativity? If not, how might you go about incorporating those skills into your assessments? Is this something teachers should be doing?
- Sternberg provides examples of questions teachers might ask to assess students' analytical, creative, and practical understanding, as well as their wisdom. Think of a unit you're currently working on, and come up with a question or two to assess each area of understanding. How can you prepare students to answer these types of questions?

- In today's diverse society, people might have differing opinions on what constitutes true wisdom. What challenges could this create for teachers who want to promote wisdom among their students? How can teachers show respect for different ideas while encouraging students to grow in wisdom?

Assessment That's About the Students

In "Formative Assessment That Empowers," Susan Brookhart, Connie Moss, and Beverly Long state that "formative assessment is all about sharing information." Teachers share information with students about what and how they need to learn, and students show teachers where they are in the learning process.

- How have you implemented formative assessment practices in your classroom? What kinds of things have you learned from your students through formative assessment? How have you adjusted your instruction in response?
- Brookhart, Moss, and Long note that "the teacher is in control of how much control the student experiences." How might formative assessment push students to take more control of their own learning? What are some specific strategies you can implement that would challenge students?

Part 6. Preparing Students for College and the World of Work

The Challenge of College Readiness, *Educational Leadership*, April 2007

What About Those Who Don't Go? *Educational Leadership*, April 2007

Bringing Industry to the Classroom, *Educational Leadership*, May 2008

Treat All Students Like the "Best" Students, *Educational Leadership*, April 2007

Creating Global Classrooms, *Education Update*, January 2009

Models for Change

Several authors have explored models for changing high schools to better challenge students. Gary Hoachlander (“Bringing Industry to the Classroom”) and Gene Bottoms (“Treat All Students Like the ‘Best’ Students”) describe high school models that integrate college-preparatory curriculum with career and technical education.

- What did you already know about these programs? Describe any experiences you’ve had teaching or learning in schools that use these approaches.
- If you work in a high school, what has your school done to integrate some of the principles used in these reform models? How might your school apply some of these ideas? Choose one of these models, or another model, and do some research on the benefits and pitfalls of adopting such an approach at your school. (For additional examples, see “Lessons from Leading Models” by Janet Quint and “How IB Prepares Students” by Jeffrey Beard and Ian Hill.)

Making Connections

In “Creating Global Classrooms,” Willona M. Sloan says that “research shows that to be successful in the 21st century, young people will need the type of skills training and socialization that online cross-cultural education projects can provide.” Online projects enable students to build technology skills and collaborate with people of diverse cultures and backgrounds.

- How are you using technology to connect your students with others? What are you and your students learning?
- Visit the two sites (www.earn.org and www.epals.com) mentioned in the article and evaluate their potential usefulness for your classroom. Generate a list of other sites and programs that could facilitate cross-cultural collaboration. Which resource

seems most appropriate for your classroom? What steps do you need to take to start using it with your students?

Part 7. Getting Students to Embrace Challenge

The Perils and Promises of Praise, *Educational Leadership*, October 2007

When Students Choose the Challenge, *Educational Leadership*, November 2007

Paying for Performance, *Education Update*, March 2009

“Inspiring Students to Strive for Excellence,” chapter from *Inspiring Active Learning: A Complete Handbook for Today’s Teachers*, ASCD 2006

Praiseworthy Praise

In “The Perils and Promises of Praise,” Carol S. Dweck warns that praising students for their intelligence can have long-lasting negative effects, leading students to believe that academic success should come easily. Praise for effort, on the other hand, can encourage students to work hard and remain resilient when the work becomes difficult.

- Read Dweck’s definition of the fixed mind-set and the growth mind-set. Which understanding of intelligence have you encountered most often in yourself, your colleagues, and your students? What effects of this mind-set have you seen in your students?
- Some students coast through school for years, successfully getting by with little effort. Others consistently work hard, but they continue to struggle. How can you help both types of students persevere when they reach academic roadblocks?
- *Washington Post* education reporter Jay Mathews wrote in his September 13, 2007, Extra Credit column, “I wish we could be more specific when we talk about individual children this way and more willing to see their gifts as the result of their labors rather than just dumb luck. . . . I have known

too many gifted people who just sat and waited for the world to hand them the prizes so many people had told them they were entitled to” (www.washingtonpost.com/wpdyn/content/article/2007/09/11/AR2007091102179_pf.html). Do you agree with Mathews’s comment? How well does his observation fit in with Dweck’s findings? How might this notion change how you relate to gifted students?

Give Choice a Chance

In “When Students Choose the Challenge,” David Suarez explains how he structured his middle school math class so that students at all ability levels were challenged with material that was appropriate to them. Students were allowed to choose problems “that were just challenging enough to make learning interesting but not overwhelming.” Student assessments were based on the level of challenge each student selected.

- How much choice do you give your students? How do they react when allowed to decide what assignments they will complete and how they will complete them?
- What difficulties do you see in an effort to implement an approach like Suarez’s? Would the potential rewards of adopting such an approach outweigh the work involved in surmounting these difficulties? If you think it would be, try generating a list of possible solutions to at least one obstacle and determine a course of action that will get you closer to establishing this kind of instruction in your classroom.
- Consider giving this approach a trial run by choosing just one of your course objectives and creating a two- or three-tiered assignment that will allow students to demonstrate mastery of the standard.

How to Spark Students' Motivation

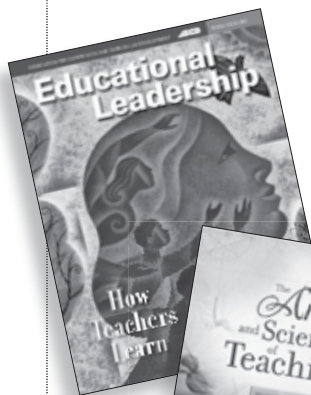
In their book chapter from *Inspiring Active Learning*, Merrill Harmin and Melanie Toth insist that all teachers can instill motivation and an intrinsic desire for excellence within *students themselves*—and they list lively, accessible classroom strategies for doing so.

One striking strategy is to discuss openly with students basic questions like why (or whether) it feels better to excel, how we should view people who don't even try to excel in certain areas, and whether one can be "excellent" even if the top test scores or high grades don't follow from sincere effort.

- Try having a frank talk with your students about these issues. "Prime the pump" by discussing times when you did—and did *not*—push yourself to do well. Notice how students react to your personal stories, particularly of times when your first effort didn't lead to success in other people's eyes.
- Probe deeper into the question, "How do you know when you can be satisfied with your current work?" (You may want to let students write their answers and pass them to you anonymously.) What do you notice about students' abilities to set their own standard? How high do they set the bar? How did individual students' answers about how high a self-standard they set correspond to where their achievement ranks in the class? Any surprises?

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